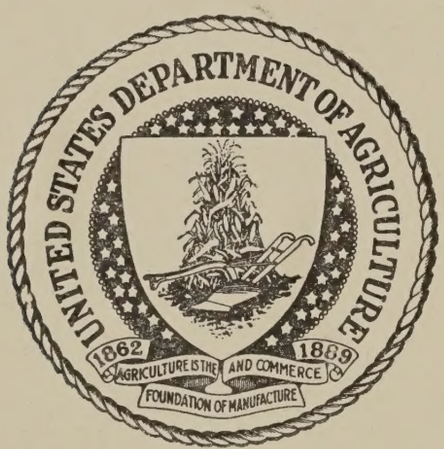
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CHAPTER I

WINDS AND WEATHER

CENTRAL AMERICAN REGION

Prepared by United States Weather Bureau

General remarks.—The region covered by this summary includes Central America and adjacent areas of the Pacific Ocean and the Caribbean Sea. All of the region lies between the equator and the parallel of 20° north latitude.

A chain of mountains extends through the interior of Central America, ranging in height from 6,000 to 11,000 feet, with intervening hills of moderate height and some plateaus at elevations of 3,000 feet or more. These elevated lands are of sufficient height to exert important effects upon the climate.

Adjacent areas of the Pacific Ocean and the Caribbean Sea are warm with small seasonal variations in temperature, hence the climate in coastal sections and over the ocean is tropical. The dominating climatic influences are, (1) the seasonal migration of the equatorial belt of calms, (2) the northeast trades, and (3) the contrasting temperature variations over the North American continent which affect the general pressure distribution and cause changes in the wind circulation, especially in the northern portion of the area. At higher elevations on the land the climate is temperate but is subject to the same influences.

Tropical cyclones or hurricanes originate at certain seasons over the ocean areas both to the eastward and westward of Central America. These occasionally influence the weather along the coasts and sometimes move to the interior but hurricanes which seriously affect this area are principally of the type that forms in the Atlantic Ocean and moves westward through the Caribbean Sea to the coast of Central America.

The belt of calms and northeast trades.—In February the belt of equatorial calms is farthest south and lies along and just south of 5° north latitude. This belt extends northward in spring and by May it reaches to the Central American coast on the Pacific side, while the northeast trades continue to dominate the weather over the western Caribbean Sea and on the northeastern coast of Central America. The frequency of calms increases in the extreme southwestern Carib-

bean Sea after the vernal equinox and reaches a summer maximum in June. Practically the whole area is then at least occasionally under the influence of the doldrums.

In late June and in July, the Atlantic high-pressure area increases considerably in strength and extent so that the trade-wind system again extends over much of Central America. In August and September the Atlantic "high" retreats and by October the Central American coast on the Pacific side is again under the influence of the equatorial calms. With the southward movement of the belt of calms in November and December, the northeast trades again prevail over most of the area under discussion. The trades are steadier and stronger on the eastern than on the western coast of Central America.

The annual variation of pressure at representative stations (fig. I) shows the rise of pressure attending strengthening of the Atlantic "high" in July. This rise of pressure scarcely reaches as far as Colon.

Northers.—The norther is any strong northerly wind which blows over the Gulf of Mexico, the western Caribbean Sea, and the Pacific coastal waters of Central America and southern Mexico during the months when strong anticyclones develop over North America and move southward, chiefly in late autumn, winter, and early spring. In the Pacific the norther is known locally as the "Tehuantepecer" when it occurs in the Gulf of Tehuantepec; and as the "Papagayo" when it blows in the Gulf of Papagayo, on the northwest coast of Costa Rica, and in neighboring waters.

The norther of American lower waters is usually accompanied by a slight to considerable rise in atmospheric pressure and a corresponding fall in temperature and percentage of relative humidity. It is often preceded by showery conditions, and sometimes accompanied by rain, though essentially it is associated with clearing or fair weather conditions. In force the norther sometimes attains a severity which renders it dangerous not only to vessels experiencing it in the open sea and in some of the continental harbors, both Atlantic and Pacific, but as well, though less frequently, even in north coast harbors of some of the islands of the West Indies, and as far to the southward as the Isthmus of Panama.

While northers usually attain their greatest strength and frequency during the months November to February, yet conditions favorable for their development may occur as early as October and as late as April. True northers of the warm weather type, however, are probably unknown in the Gulf of Mexico, and northers are very infrequently experienced at this time of year on the Pacific side of lower Mexico.

In former years the autumn northers on the east coast of Mexico were thought to be part of the wind circulation of tropical cyclones then existing in the Gulf, while the Pacific northers were believed to

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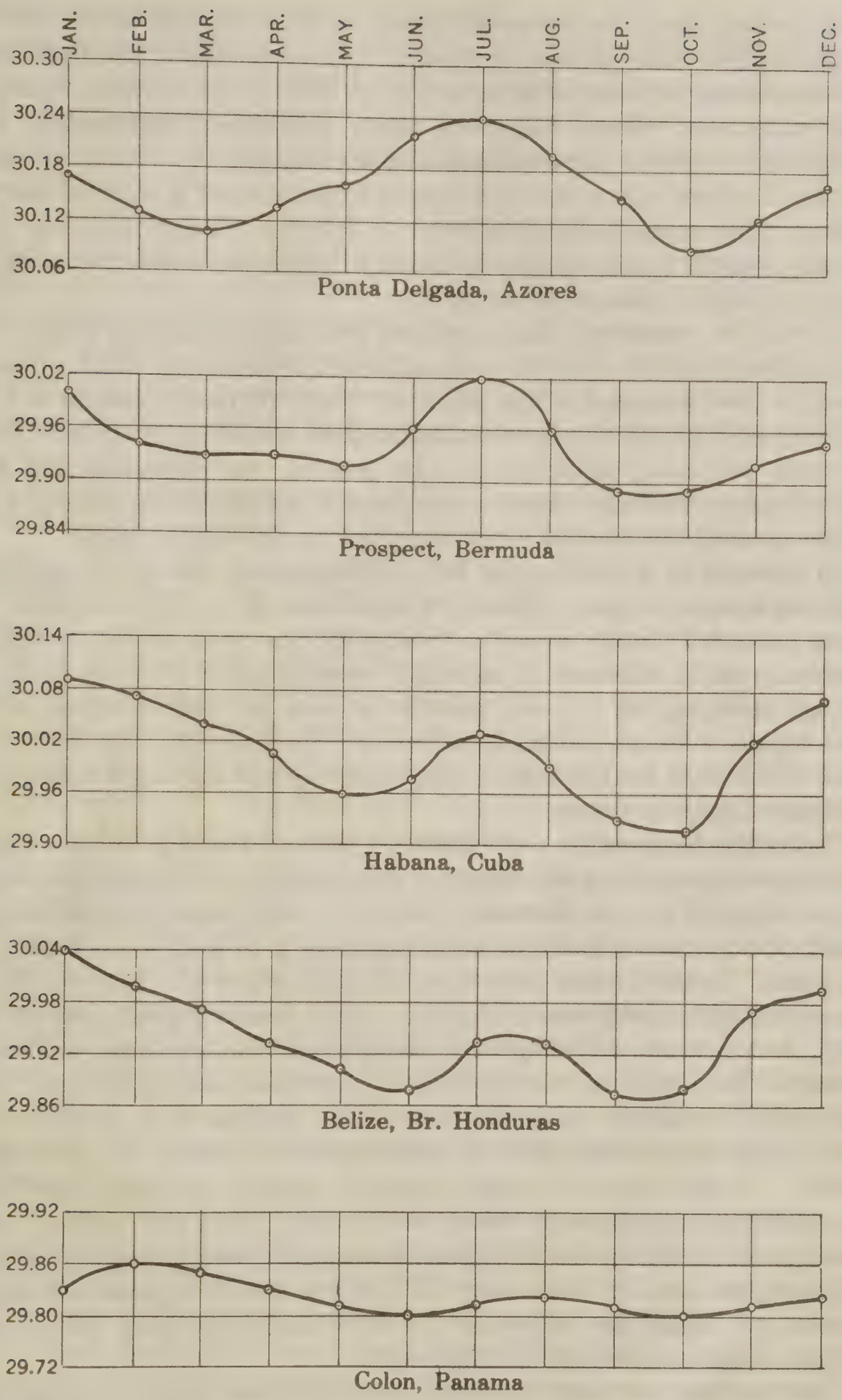


Figure 1. Mean Monthly Pressures.

Representative stations showing midsummer increase attending intensification of the Atlantic High.

be attendant winds of tropical storms later to appear to the northward. When the cyclones arrived in the upper Gulf, the northerly winds on their western sides were the northers most worthy of particular attention. Since many of these hurricanes approached the Mexican coast from the eastward, the appearance of a violent norther in costal waters was a pretty accurate forerunner of a tropical storm, with a violent southerly gale, soon to follow. Today it is not customary to refer meteorologically to the winds in the western quadrants of low latitude cyclones as northers.

It may be reiterated that northers are, fundamentally, cool, dry, anticyclonic winds, but they are affected by cyclones that precede them in low latitudes. The primary effect in many instances is a drawing of Polar air farther southward than would occur if there were no such preceding disturbance. In general, the essentials are the strong continental high moving southward toward the equatorial belt of low pressure or toward a traveling low in the east or south.

In advance of a norther the belt of cloudiness—which occasionally may be a more or less pronounced squall cloud, though commonly a more extended cloudy area—is frequently observed on the northern horizon. As it advances it is usually accompanied by precipitation, though this may be followed shortly by cool, dry winds which burst into a gale if the causation is sufficiently pronounced. In the lower part of the Gulf heavier and more general as well as longer continued rains are likely to occur.

Preceding the norther over southern waters, there may be a slight decrease in pressure, particularly if a depression be crossing the Gulf. It is followed by an increase, however, sometimes comparatively small, though more likely to be as much as 2 to 6 or more tenths of an inch. In the former case the anticyclone has not the energy to cause a hard, general sweep of strong winds across a great area of the Gulf, but spreads more quietly southward, though with sufficient strength to overcome the preceding sultriness and give fine, dry, anticyclonic weather, with cloudless skies, and gentle to brisk northerly winds that often blow at their freshest during the afternoon hours. In case there is a great pressure change, the high may have so powerful a southward sweep as to carry its Polar current and rising pressure across the Gulf and thence with reduced energy almost to the equator, as in December 1917, when, during a moderate north gale on the 30th, the barometer at the Canal Zone gave the second highest reading on record for the month.

The temperature may also fall to an unusual degree during the prevalence of a strong norther in the Gulf, as in the violent norther of February 1899 when practically wintry conditions enveloped the entire sea as far south as the Isthmus of Tehuantepec and the island of Cuba.

Northers of the Canal Zone.—A distinction has been drawn between the northers and the intensified trades of the Isthmus. Intensified trades are really not storms at all, but might be considered as the maxima in a normal variation of the trades. They develop slowly and very seldom cause any damage but sometimes attain considerable force along windward coasts.

It appears that when a North American anticyclone descends far enough equatorially to affect the weather at this low latitude, if the trades are blowing at the outset on the Atlantic side of Panama, the added result will be an intensified trade. If, however, southerly or variable winds are blowing prior to the onset of the high, when the change to northerly occurs, usually with squall suddenness, it then appears as a true norther. Both types of northerly winds are generally known as northers.

In the light of this consideration of the northerly winds at the Canal Zone, if one attempts to discriminate sharply between the true northers and the so-called intensified trades, the former appear to be rare. In fact, Chapel enumerates only six that he calls undoubted northers as occurring during the 19-year period, 1908–26, all of which were preceded by southerly or variable winds. The dates of these are as follows: November 17, 1912; November 24–25, 1917; December 3, 1910; December 10, 1914; February 9 and April 3–5, 1915. In two of these instances wind velocities exceeded 35 knots for a brief time, that in November 1917 being 36 knots, from the northwest, and that in April 1915 being 40 knots, from the northeast. This last high velocity is of peculiar interest because of its showing of a maximum strength as a winter-type storm in this low latitude at so late a time in the season.

There is usually little weather warning of the approach of a norther in this neighborhood, and little or no increase in atmospheric pressure occurs until the wind is at hand. Almost immediately upon its burst the norther is near or at its height of force, and the barometer begins to rise. The storm, as it is called, may last only a few hours or for 2 or 3 days. The periods of intensification of the trades may last longer; in 1917 one of them continued for 8 days, from January 27 to February 3.

Increases in the force of the northerly winds sometimes occur there in October, but the favorable season is not likely to begin until November or December, or a few weeks later than in the Gulf of Mexico. It usually ends in March or earlier, but the instance already mentioned of the most violent true norther on record for the zone, that of April 3–6, 1915, shows that the season of possible occurrence in the Tropics may be unusually extended.

Northers of the Gulf of Tehuantepec.—This is a different type of norther. Up to this point there has been considered the true norther, which is a direct anticyclonic wind, or gradient norther, as it blows

over the Gulf of Mexico and less frequently in the Caribbean Sea. With it has been noted an analogous wind, the intensified trade, of the neighborhood of the Canal Zone. The Tehuantepecer is a norther peculiar to the Gulf of Tehuantepec. It blows strongly in the cooler months, during which period it is usually of much more frequent occurrence than is the northerly anticyclonic gale of the Gulf of Mexico.

The Tehuantepecer, while resultant from the anticyclone to the northward, is in itself only a derivative or overflow norther, despite the fact that it is frequently if not commonly a wind of greater force than the simultaneously existing true norther of the upper Gulf. In fact, it sometimes occurs with gale intensity when the pressure gradients to the northward are too slight to cause northers of much consequence in the Gulf of Mexico. Its cause is a strong flowing of anticyclonic air through the comparatively low and narrow Tehuantepec pass whence it emerges upon the Pacific slope down which it pours violently to the Gulf of Tehuantepec frequently thereafter overspreading the entire gulf and often continuing far southward upon the waters of the Pacific.

As the Tehuantepecer sweeps upon the Gulf it may be accompanied by a brief period of light to heavy rain from a preliminary arched squall cloud. As this advances, however, it is usually followed by quickly clearing skies except for passing cirrus or alto-cumulus forms. Upon other occasions the sky over the sea is cloudless throughout, or the cloud arch, if any, is rainless.

A barometer change does not always occur, though frequently at the outset there is a slight fall, then a slight rise. But if the high pressure bank extends unusually far south, the barometer immediately below the Isthmus of Tehuantepec may rise appreciably.

Temperature changes are often unimportant, though a slight fall may be observed, accompanied by lower humidity. As the norther flows down to sea level from the low elevations of the Isthmus, it must be somewhat warmed adiabatically by descent. Therefore at the head of the Gulf there will not be as great a cooling as would occur had the wind a level sweep across the Isthmus.

The wind direction may be from west-northwest to east, with northwest to northeast as the most common directions. Only occasionally is it likely to blow from the east, and that in the lower waters of the Gulf of Tehuantepec, or along the western coast, where it may be deflected by the neighboring hills.

During the 12-year period, 1924–35, northers of gale force—8 to 12 on the Beaufort scale—were reported by seamen in the Gulf of Tehuantepec on 285 days, in addition to many other days with only moderate gales or winds of force 7. Of the entire number more than half occurred during November and January. The total number of days

with gales equaling or exceeding force 8 by months—and it cannot be supposed that all have been reported—follows: October, 18; November, 67; December, 50; January, 69; February, 43; March, 21; April, 16; May, 1. In other months moderate norther gales, that is, of force 7, occurred on 3 days in July 1930 and on 1 day in September 1935.

Close to one-seventh of these Tehuantepecers have been of the higher wind forces, 10 to 12.

Papagayos of the Central American west coast.—Going southeastward from the Gulf of Tehuantepec along the Central American west coast, the northeasterly Papagayo is sometimes experienced, especially in winter and during the prevalence of the Tehuantepecer. The name Papagayo is a local but generally accepted one, derived from the Gulf of Papagayo, on the upper Costa Rican coast, which is close to the southern limit of the wind. The term may be applied generally to all north and northeast gales of the norther type which occur in coastal waters from the eastern extremity of the Gulf of Tehuantepec to lower Costa Rica, and sometimes has been applied to all similar winds below Point Guatulco at the western extremity of the Gulf of Tehuantepec.

The Papagayo, like the Tehuantepecer, is primarily a norther, but usually of less violence and spread.

During recent years, specifically from 1924 to 1935, information gathered from seamen's reports indicates that the northeast gales of the open-water Papagayo type are more frequent along about latitudes 9°30′ to 11°00′ N., longitudes 85° to 87° W., than elsewhere off the coast below the Gulf of Tehuantepec. During the 12-year period the months of principal occurrence here were December to February.

Tropical cyclones or hurricanes.—The wind system of the hurricane is more or less circular. When it passes over a given locality, the winds do not begin abruptly, but increase gradually.

At the outer limits of the hurricane the winds are only moderate breezes, though characteristically gusty and fitful. They increase in force as the center approaches, though the highest winds are not at the exact center but generally from 5 to 15 miles, and sometimes even farther, therefrom. Records indicate that these strongest winds often reach and, for 5 minutes or more, maintain velocities of 65 to 100 knots, and occasionally even 110 to 130 knots, with gusts of still greater velocities. The measurement of such winds obviously is attended with great difficulties. In many instances the anemometers have been destroyed by the winds and flying debris, or the towers or supports have been blown down before the highest wind occurred.

At the center of a tropical cyclone there is an area known as the "eye of the storm" where there is little or no wind. In this central area the sky sometimes clears so that the sun is visible by day and

stars by night. The temperature in some cases rises and the air becomes drier. At sea the waves in the "eye of the storm" commonly are described as mountainous and confused. All around this relative calm is the encircling wall of hurricane winds, which produce a rumbling or roaring sound. The diameter of the relatively calm center is not the same in all storms and may be as little as 7 miles, or less, but is rarely more than 20. It averages about 14 miles.

When the calm center, or "eye", of the storm passes over a place, the calm is *preceded* by winds of great violence from one direction and is *followed* by winds nearly equally violent from the opposite direction. Thus, if the hurricane approaches from the east, violent winds blow first from a northerly direction and, after the passage of the calm center, equally violent winds come from a southerly direction. As the hurricane approaches, the barometer falls, slowly at first and then more rapidly as the center draws near. The rate of fall depends upon the depth of the barometric depression in the storm and the rate at which it approaches. In fully developed hurricanes the barometer nearly always falls below 29 inches (sea level), and there are many records of readings below 28 inches and a few below 27 inches.

At the outer limits of the storm, rainfall is in the form of showers. As the center approaches, the characteristic squalls of the hurricane begin and the showers increase in frequency and intensity. Nearer the center the rain is heavy and continuous. Frequently the total amount of rainfall which occurs at any one place during the passage of a hurricane is quite large. Amounts exceeding 30 inches are not uncommon.

Along the coast toward which the hurricane is advancing the tide begins to rise while the storm center is a long distance away. It continues to rise as the storm advances, slowly at first, then more rapidly. If the observer stands on the shore facing the storm center the highest tides will be created on his left and will be highest at and somewhat to the left of the point where the center crosses the coast. At his right the tides will not be so high, and as the center moves inland, the water, driven by offshore winds, may be very low.

Other things being equal, a storm of large diameter creates higher tides on the coast than one of small diameter, and a slow-moving storm causes higher tides than one of rapid progress. In each case the higher water is due to the greater duration of the drive of the wind on the water in the same direction.

Winds of the hurricane blow around and incline towards the center. Their direction in the northern hemisphere is counter-clockwise. The "law of storms", as enunciated by Buys-Ballot, is that the observer standing with his face to the wind will find the storm center on his right. Since the winds have some incurvature, the center will be on his right and slightly to the rear.

On the side of the storm where the direction of the winds is the same, roughly, as the progressive movement of the storm, the observer experiences higher winds than on the side where the winds and the progressive movement are oppositely directed. If the observer faces the center of the approaching storm, and the center passes over him, the highest winds will occur in his immediate vicinity and at places to his left.

In small hurricanes the diameter of the area of destructive winds may not exceed 25 miles, while in some of the greatest the diameter may be as much as 400 to 500 miles.

Premonitory signs of the hurricane.—In the Tropics the weather is normally somewhat the same from day to day. The extratropical cyclones and the anticyclones, which cause frequent changes in weather conditions in higher latitudes, seldom extend their influence into the tropical and subtropical regions to any marked degree during the season of tropical storms. For that reason the approach of the hurricane is sometimes suspected when it is a long distance away because of relatively slight changes from the prevailing weather conditions for the season.

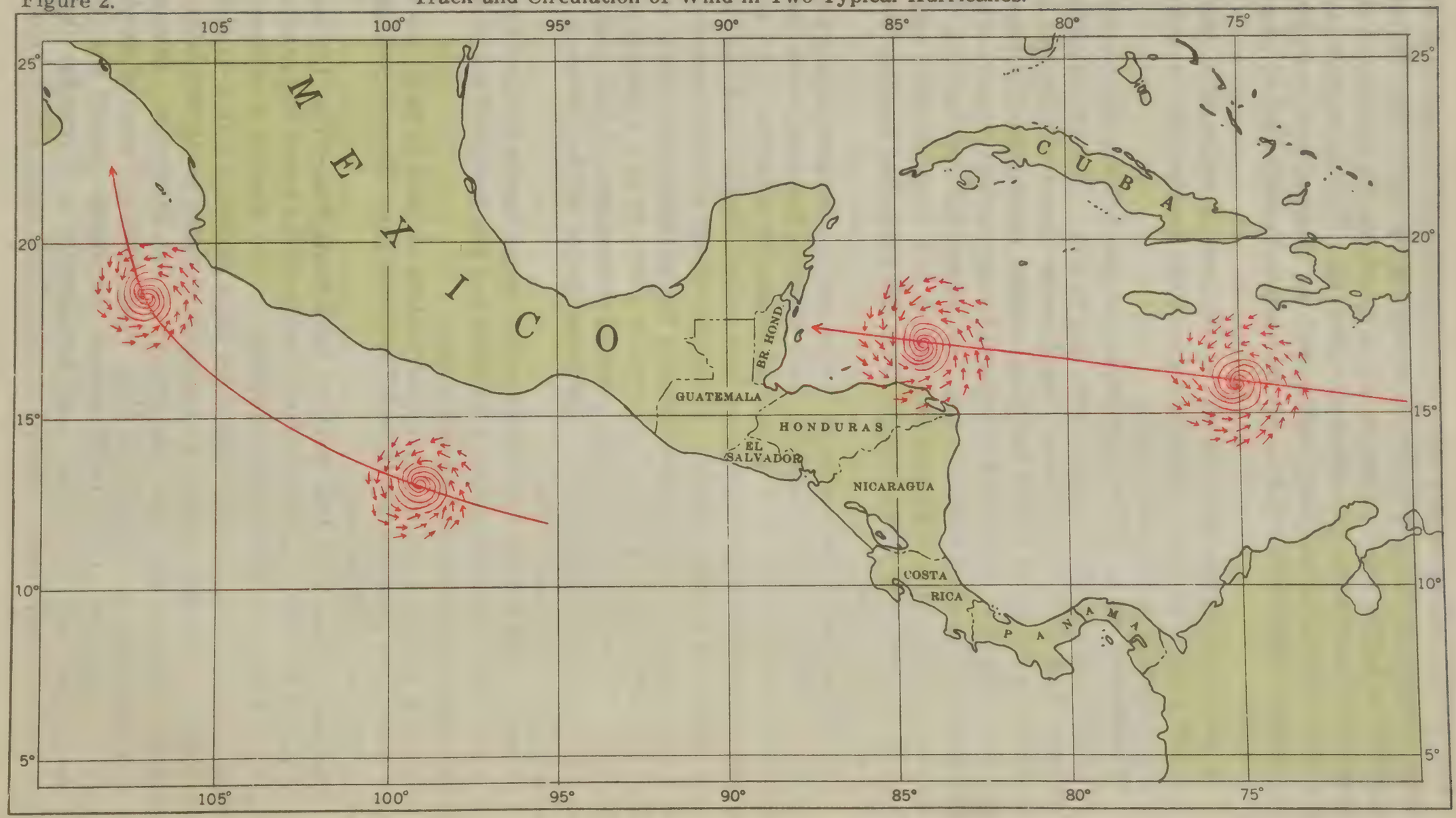
One of the first definite signs is the sea swell. It appears at sea as a long, unbroken wave, with the time interval between crests considerably longer than it is in waves ordinarily observed. As the storm approaches, the seas become heavier and rougher and the tide rises above its normal height. In places where the sea cannot be observed, one of the first indications is the appearance of cirrus, or high feathery clouds, which often seem to converge at a point on the horizon. By some observers the point of convergence of high clouds on the horizon is considered a reliable indication of the direction in which the storm center lies.

At sunset and sunrise the clouds on the outer border of the hurricane are highly colored; hence a brilliant red sky is one of the well-known signs of an approaching hurricane.

Figure 2 portrays the track and circulation of wind in two typical hurricanes, one approaching British Honduras from the east and the other off the Pacific Coast.

Tropical cyclones of the western Caribbean Sea.—The tropical cyclones or hurricanes of the western Caribbean Sea are of two general classes. First is the type that develops in the western Caribbean, sometimes remaining nearly stationary for a period of 1 to 3 days in the form of a system of light to moderate cyclonic wind circulation, unsettled weather and slight depression of the barometer. Storms of this type form occasionally in May, more often in June and rarely in July or August. Later in the season, sometimes toward the end of September, and in October, and occasionally in November they form in the same area. Storms of the June type usually move

Figure 2. Track and Circulation of Wind in Two Typical Hurricanes.



northward or northwestward into the Gulf of Mexico. Occasionally one touches the northeastern shores of Honduras or passes through British Honduras and across Yucatan into the Bay of Campeche. They seldom attain marked violence in these early stages, and they are not of large diameter as a rule.

Tropical cyclones that develop in the western Caribbean Sea later in the year (most frequently in October) usually move northward or northeastward into the eastern Gulf of Mexico or across Cuba toward Florida and the Atlantic Ocean. A few have moved westward across the Caribbean coast of Central America. Though generally of only moderate force in low latitudes, they sometimes develop marked violence in moving to somewhat higher latitudes and a few have become full fledged hurricanes while in the western Caribbean.

The second and more dangerous type, so far as the eastern shores of Central America are concerned, is the hurricane that comes from the Atlantic Ocean. They sometimes reach great intensity in passing westward through the Caribbean Sea and if they do not recurve more to the northward as is usually the case, these storms may be very destructive on the eastern coast of the Yucatan Peninsula. The great majority of hurricanes of this type form in August and September.

Records from 1887 to 1933 include only 33 tropical cyclones that have actually crossed the Caribbean coasts of British Honduras, Honduras, and Nicaragua. However, many of them have moved on very short tracks from place of origin to the coast and have dissipated on passing inland, hence it is likely that some of them have not been recorded. The monthly frequency of known storms on these coasts is shown in table I.

TABLE I.—*Tropical storms which have crossed the eastern coasts of Central America*

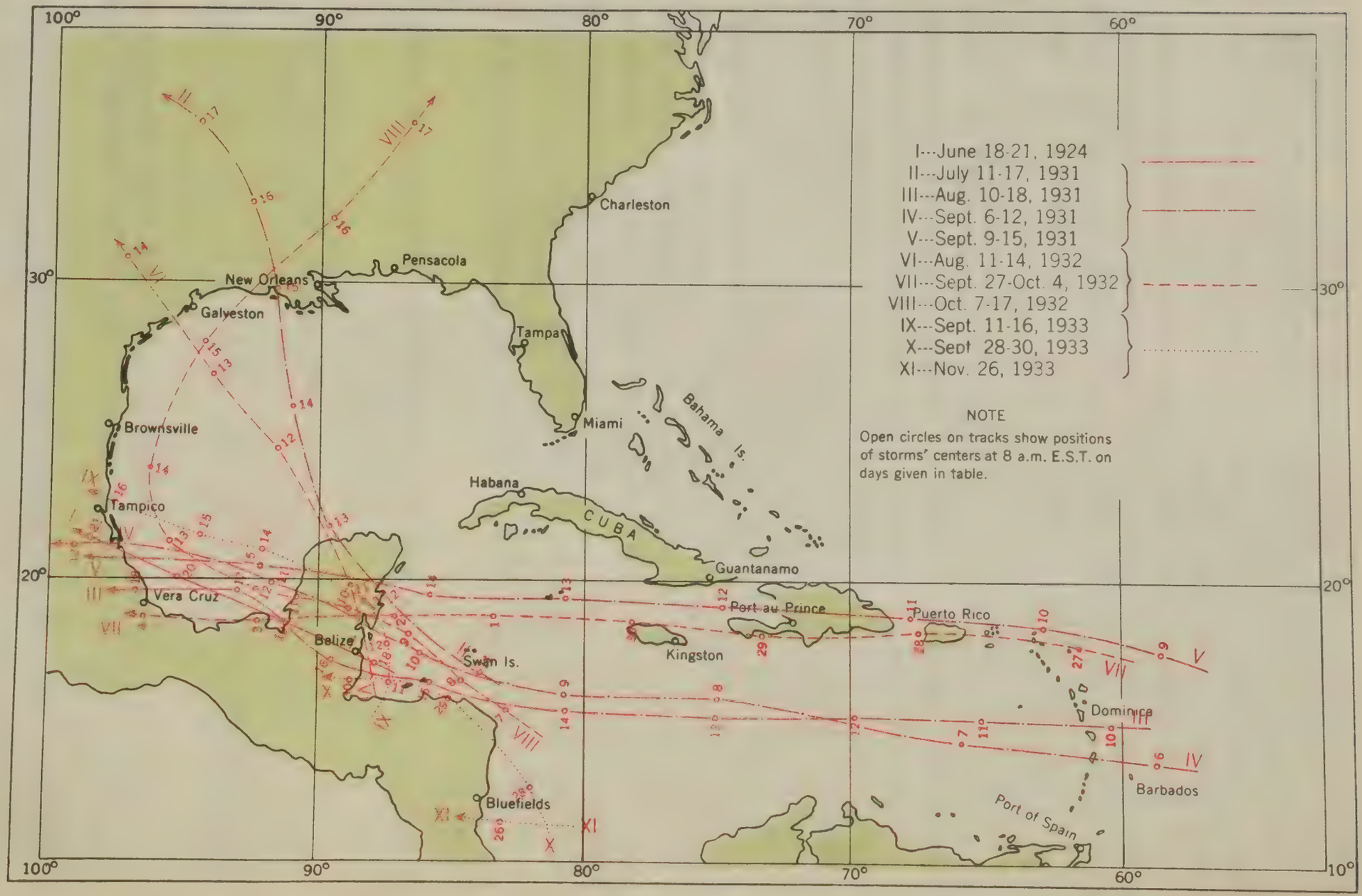
[1887–1933]

	June	July	August	September	October	November
Western Caribbean cyclones	5	1	1	6	9	2
Atlantic cyclones	0	0	4	3	2	0

Tracks of tropical cyclones which have crossed the eastern coasts of Central America during the period from 1924 to 1933 inclusive, are shown on chart I.

Tropical cyclones of the eastern North Pacific.—Draw a line southwestward from Point Eugenio (27°51′ N., 115°05′ W.) on the coast of Lower California to meet the tenth parallel of north latitude, in longitude 125° west, thence eastward to the Costa Rican coast, and with the intermediate land boundary for one side, there is inclosed in a rough triangle the principal part of the region affected by tropical storms.

Chart 1. **Tracks of Tropical Cyclones which crossed the Eastern Coasts of Central America**



To be sure, cyclones sometimes form farther to the southward, sometimes extend their activities farther to the northward and eastward, and occur occasionally within a comparatively narrow belt running 30° or so to the westward of the meridian given as the western apex of the triangle, yet within the boundaries delineated they are exhibited to the fullest, and here the most of them have birth, progression, and dissolution.

The summer weather here is usually hot and humid. The normal wind circulation is light and more or less unsteady over a great part of the area. Calms are frequent in most portions, and conditions are ideal for tropical disturbances. In coastal localities the rainy season begins usually in June, except that it arrives considerably later over Lower California than along the coast proper farther to the southward. With October, precipitation generally begins to lessen.

The period of cyclonic occurrence fairly well coincides with that of the rainy season. A very few cyclones occur in May, but in June there is an average occurrence of one in about 2 years, with only slight increase in cyclone numbers in July. In August there is an increase to an average of about one storm annually. In September, at the height of the season, almost twice as many storms occur on the average as during all the preceding months, and about two-fifths of the annual number occur then, with an average of two per month, as compared with the annual average of five. In October the number of storms decreases to an average of one annually, and in November only two tropical storms were reported during 26 years of unbroken record.

In this period, 40 percent of the entire number of 132 cyclones catalogued have been classed as hurricanes, of which 2 occurred in May, 3 in June, 6 in July, 12 in August, 17 in September ,11 in October, and 1 in November.

The usual progressive movement of these cyclones is toward the northwest at varying distances off the Mexican coast, but some, originating near the tenth parallel, move almost due northward and strike the coast in various localities. Those that originate southeast of the Gulf of Tehuantepec move first toward west-northwest, as a rule, then recurve into northwest. The major number of coastal storms continue on to Lower California, and then pass to one side or other of the Peninsula. Some, however, enter the Mexican coast to the southward of Cape San Lucas (22°52′ N., 109°54′ W.).

Central American costal waters are not often visited by dangerous winds resulting from these storms, since they seldom form close to land in these latitudes. Of all the Central American republics, Guatemala is most likely to be affected, but only during the initial stages of those cyclones that form to the southward and cause heavy rains in coastal localities. Most of Central America is more affected on both coasts by rains due to tropical disturbances entering from the

eastward than from the westward. Those which move inland from the Caribbean Sea usually lose force quickly but rains continue as the cyclone dissipates.

The progressive speed of these cyclones averages much less than in most other regions traversed by tropical disturbances. The usual rate may be set at 8 to 10 miles per hour, with extreme speeds as low as 2 miles an hour and as high as 20.

The duration of storm and length of track varies from about 2 days over a short stretch of sea to 6 or more days along the entire stretch of the Mexican coast, disregarding an occasional cyclone that continues as a barometric depression into the United States. In the case of the storms of briefest known existence, lack of observations due to extremely small diameters of storms in regions outside of the regular vessel lanes may account for their apparent noncontinuance.

The diameter of these cyclones is comparable to those that traverse the head waters of the Bay of Bengal. They are often narrow, sometimes less than 50 miles in width over the entire affected area, with an extremely narrow zone in which gales occur. Occasionally storms, however, especially in the neighborhood of the Revilla Gigedo Islands (18°50′ N., 111°00′ W.), have a wide belt of severe storminess, with a total affected width of 200 or more miles observed in rare instances. No coastal storm has been known to be as large.

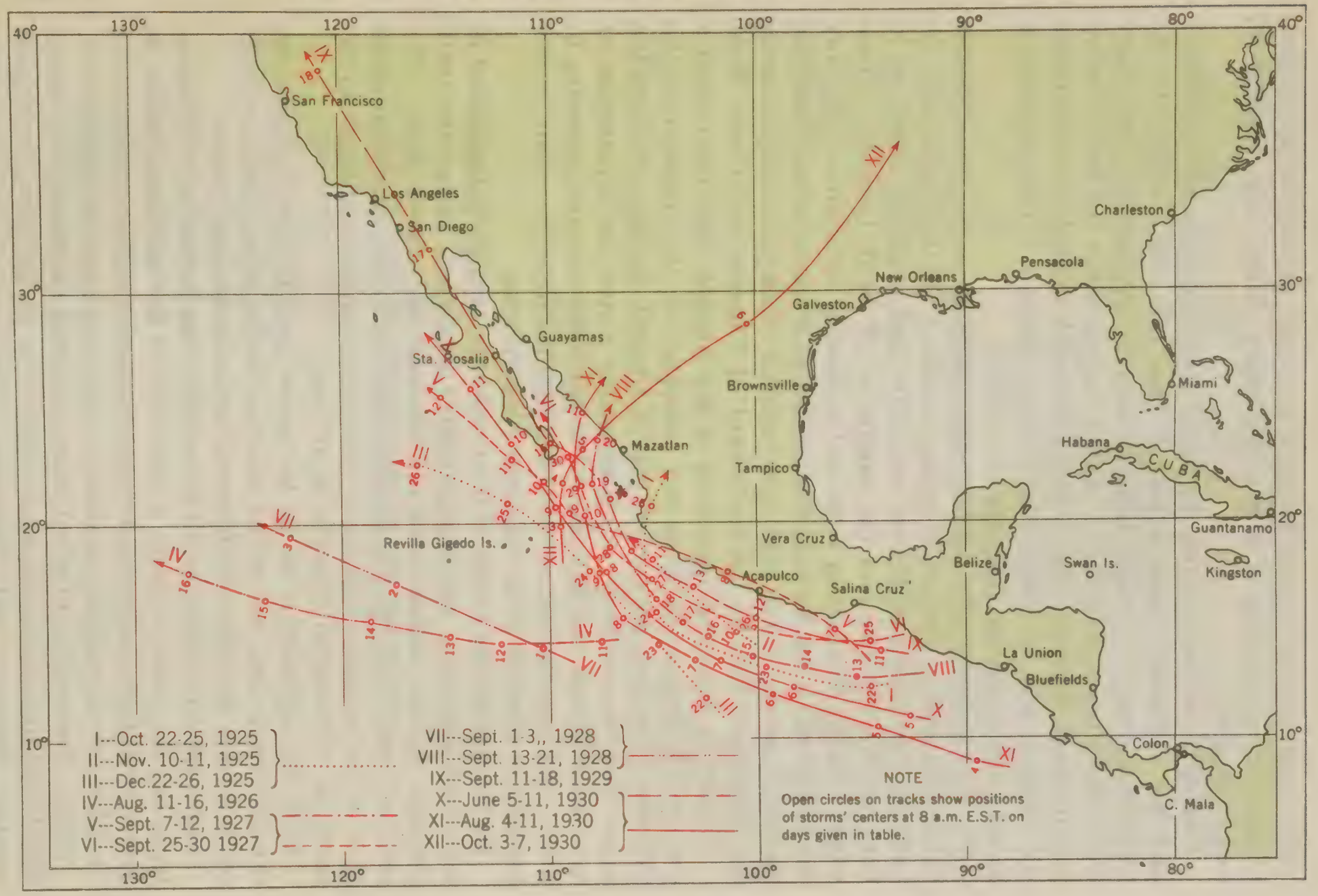
Many of the storms run parallel to, and at a considerable distance from, the Mexican coast. At such times all harbors to the eastward of the affected region experience a heavy sea swell from the south, with light to moderate southeast or east winds. However, the centers of northward moving cyclones sometimes lie close to the coast and cause much damage as a result of high winds and rise of the sea over adjoining lands from Acapulco (16°51′ N., 99°53′ W.) well into the Gulf of California.

Tracks of tropical storms of this region during the period from 1925 to 1930 inclusive, are shown on chart 2.

Winds and weather of ocean areas adjoining Central America.—In preparing charts 3 to 13, inclusive, more than 150,000 observations taken on shipboard during the period from 1880 to 1933 were compiled and summarized. The area on the east of Central America is bounded by the parallel of 20° north, the meridian of 75° west and the Central and South American coast; the area on the west extends to the meridian of 100° west and to the Equator.

In considering these observations it must be kept in mind that they were practically all taken at noon Greenwich time, which is early morning in the Central American region. Since there is some diurnal variation in weather conditions, especially in winds along the coasts, with a tendency toward strengthening of the prevailing winds at that hour, when offshore, and a weakening or occasional reversal at that time of day in prevailing winds blowing on shore.

Chart 2. Tropical Storms of the Southeastern North Pacific Ocean, 1925 to 1930 inclusive.



To illustrate the annual changes in wind, 5 months have been chosen for preparation of charts—February, May, July, September, and December.

During the winter months, the belt of calms moves slowly southward and the northeast trades extend farther into the Pacific. In the Caribbean area the trades diminish slightly in constancy and force from December to February. At the end of winter the belt of calms is in its southernmost position of the year with variable winds between the Equator and the parallel of 5° north latitude. This situation is shown graphically for February on chart 3.

On the Caribbean side the force and constancy of the trades do not change materially during the spring months. On the Pacific side the belt of calms moves northward until May and southerly winds set in between the Equator and the parallel of 5° north latitude. These winds steadily increase in force and constancy until June. In May the belt of calms lies between the parallel of 5° north latitude and the Central American coast, with light variable winds prevailing also over the Caribbean Sea to the northward of Panama and Costa Rica.

Usually in June the upbuilding of the Atlantic high has caused a perceptible increase in force and constancy of the trades over the Caribbean Sea and the eastern part of Central America, while at the same time the southerly winds extending across the Equator to or somewhat beyond the fifth parallel of north latitude are increasing in force. By July the belt of calms has been restricted in extent by this increase in strength of the adjacent wind systems.

By September the trades of the Caribbean area have diminished in force and regularity and light variable winds and calms are again frequent in the region north of Panama and Costa Rica. The southerly and southwesterly winds on the Pacific side have diminished in force but continue with much constancy to a line running from 10° north at 100° west to 5° north at 80° west.

With the beginning of winter the trades again increase in force over the Caribbean area and extend into the Pacific, where they are likely to blow from any direction between northeast and northwest.

Northwesterly winds prevail through the year in the Gulf of Tehuantepec but they are evidently a derivative of the northeast trades, as they vary in force and constancy simultaneously with the trades of the Caribbean area, reaching maxima in winter and again in mid-summer.

Ship's observations of cloud amounts, cloud directions, and exceptional visibility are also shown in charts 8 to 13, inclusive, for typical months, February and September. The symbol "v" has been widely used by mariners to record "unusual visibility" without any definite standards of observation. The relative conditions of visibility in the various parts of the area at Greenwich noon are reflected in charts 10 and 11 for February and September.

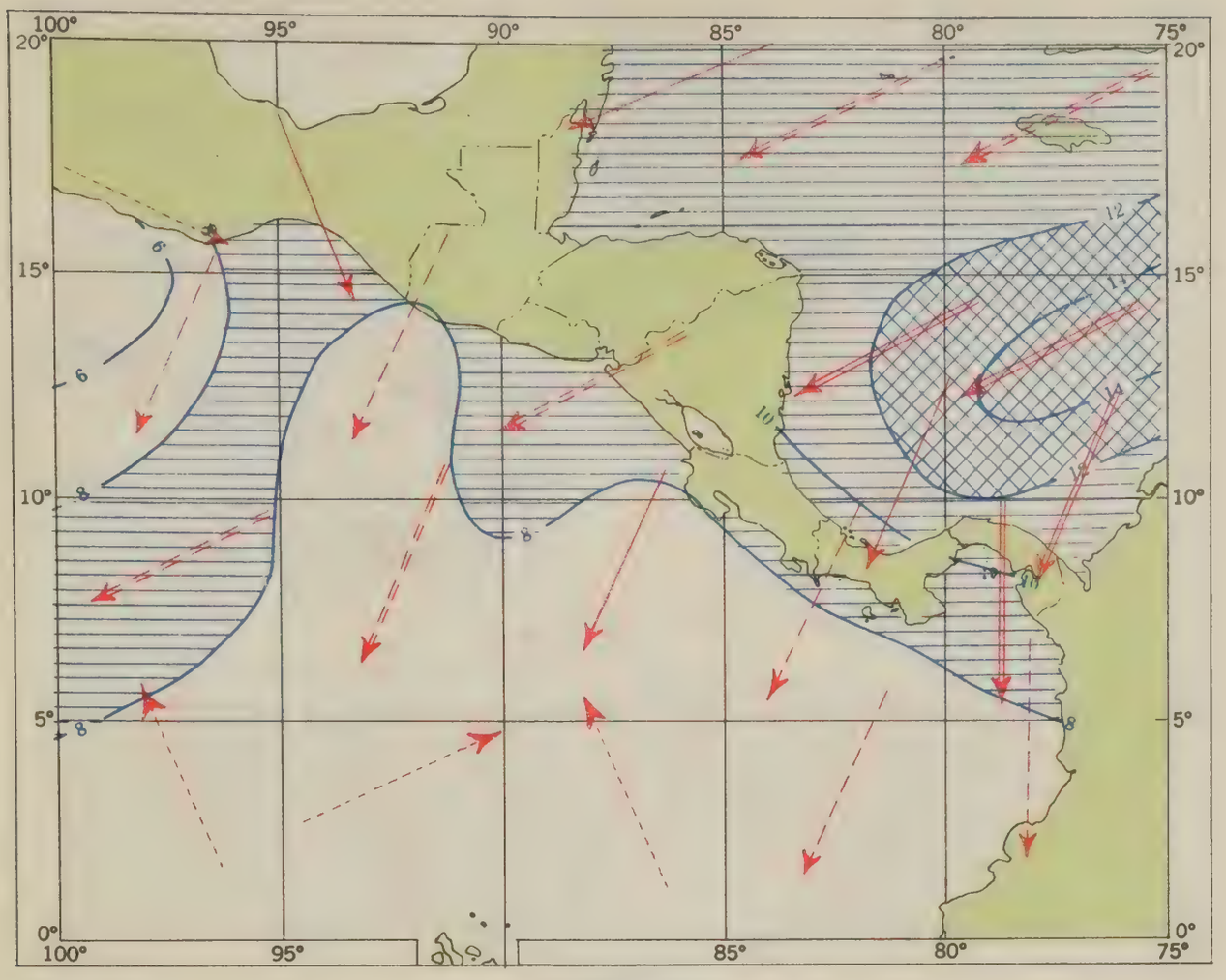


Chart 3.

February

Average Surface Wind Drift.

Direction, Constancy and Force.

Secondary Velocity

Indicates prevailing direction of secondary winds. The direction of secondary winds is shown below primary wind arrows in squares where the secondary winds differ more than ninety degrees in direction from the primary winds and approach them in frequency.

Direction and Frequency.

The arrows fly with the wind.

- 70% or more
- 60% to 69%
- 50% to 59%
- 40% to 49%
- Less than 40%

Average Velocity

No shading. less than 8 knots.

8 to 12 knots

12 knots or more

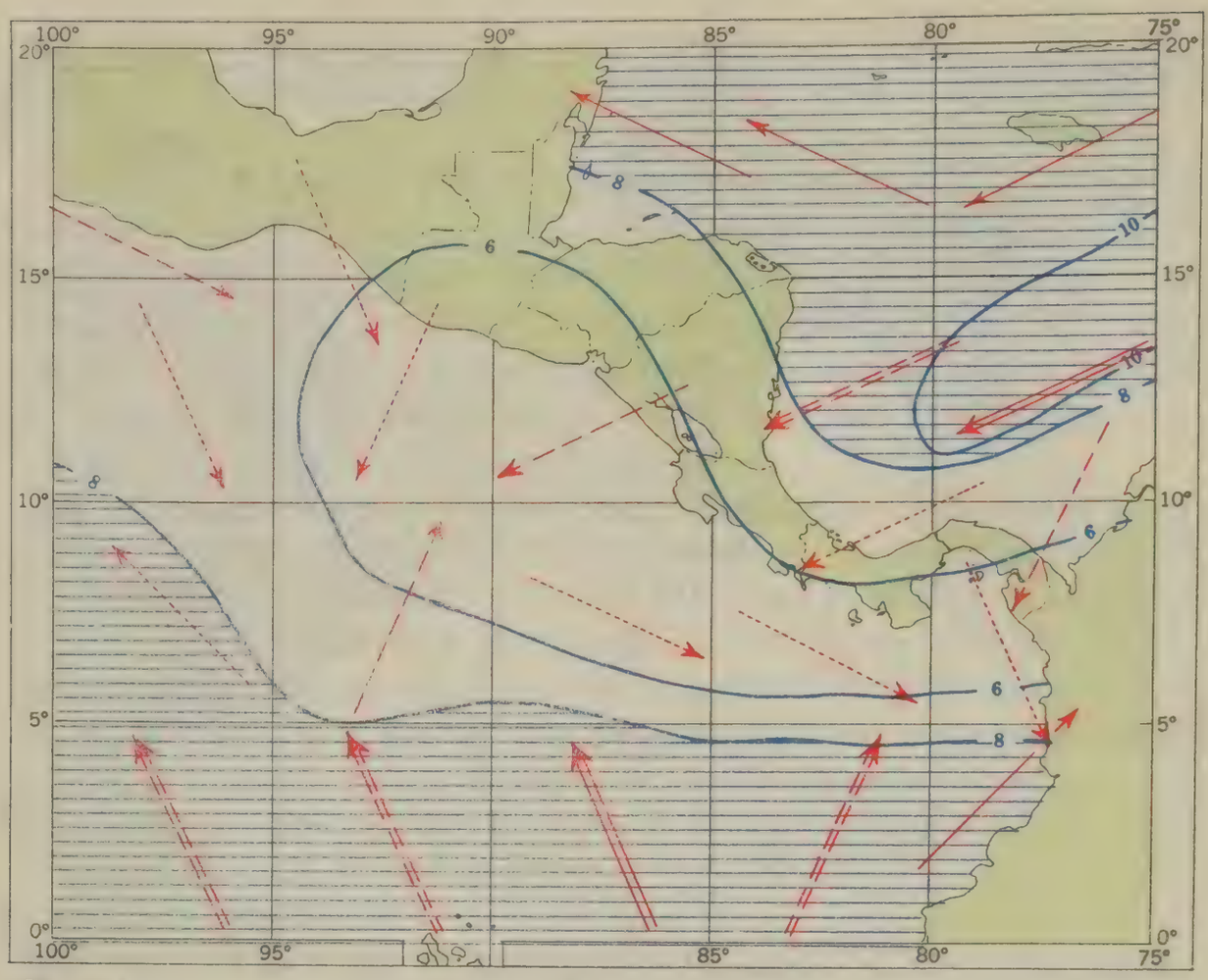


Chart 4.

May
Average Surface Wind Drift.
Direction, Constancy and Force.

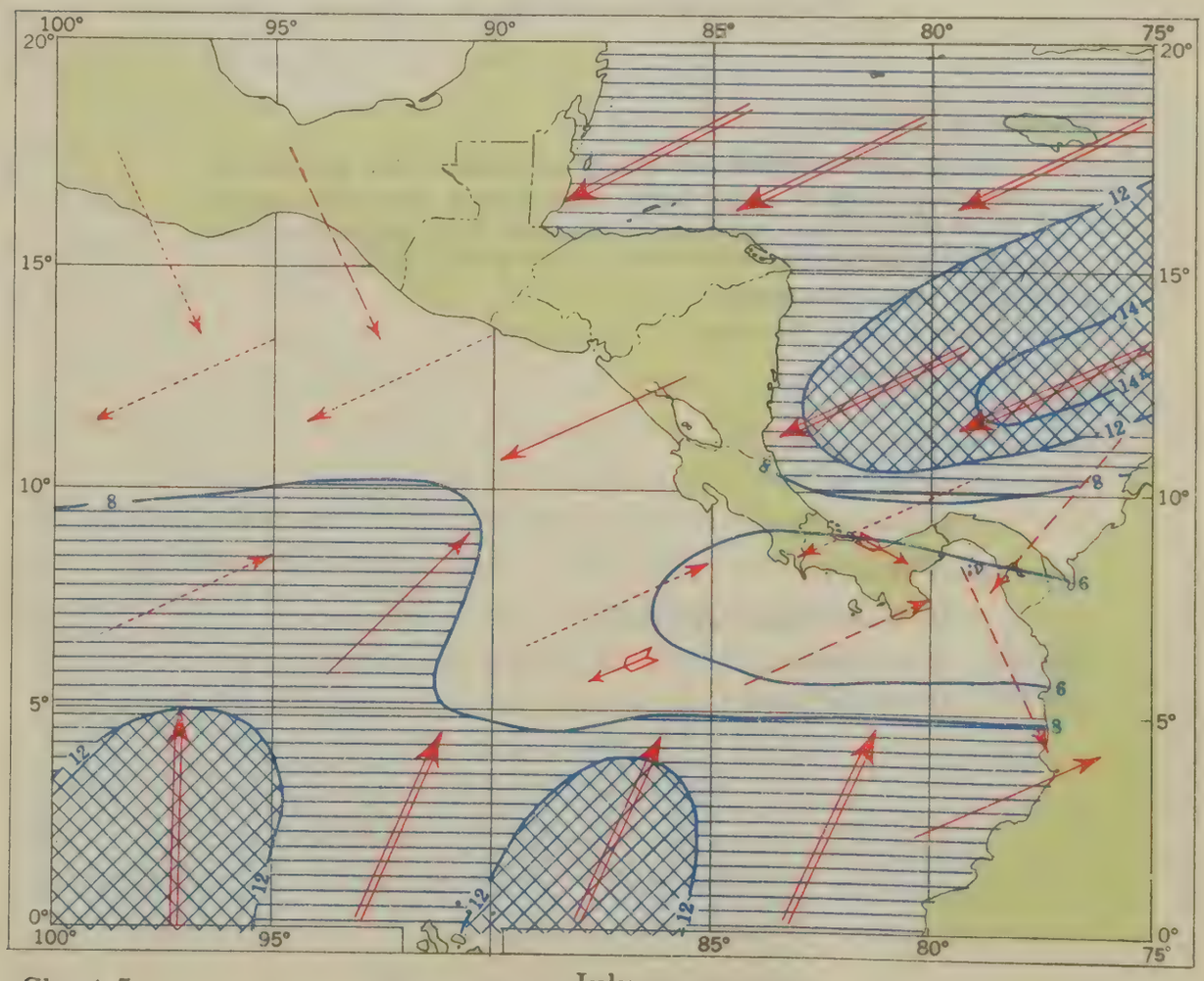


Chart 5.

July
Average Surface Wind Drift.
Direction, Constancy and Force.

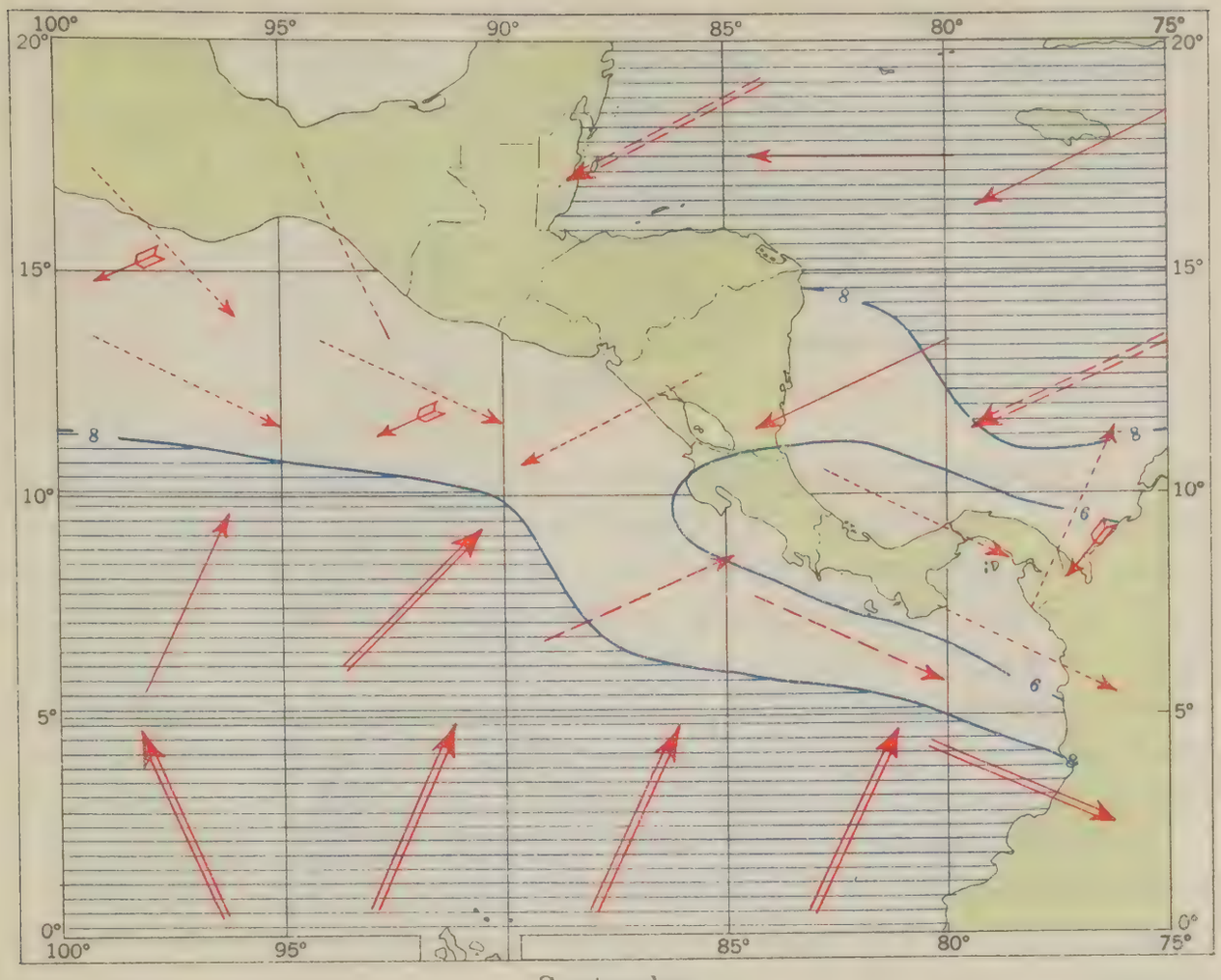


Chart 6.

September
Average Surface Wind Drift.
Direction, Constancy and Force.

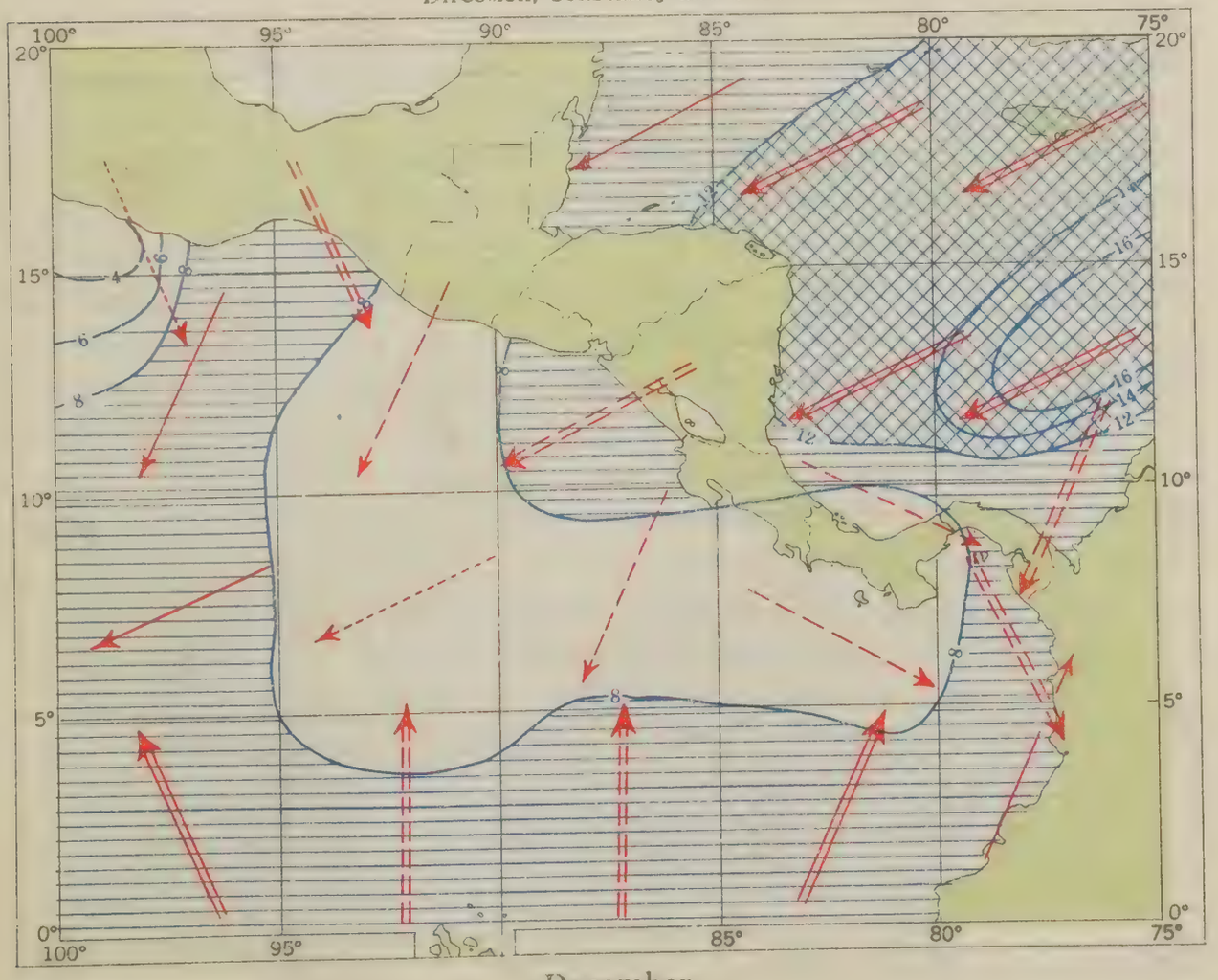


Chart 7

December
Average Surface Wind Drift.
Direction, Constancy and Force.

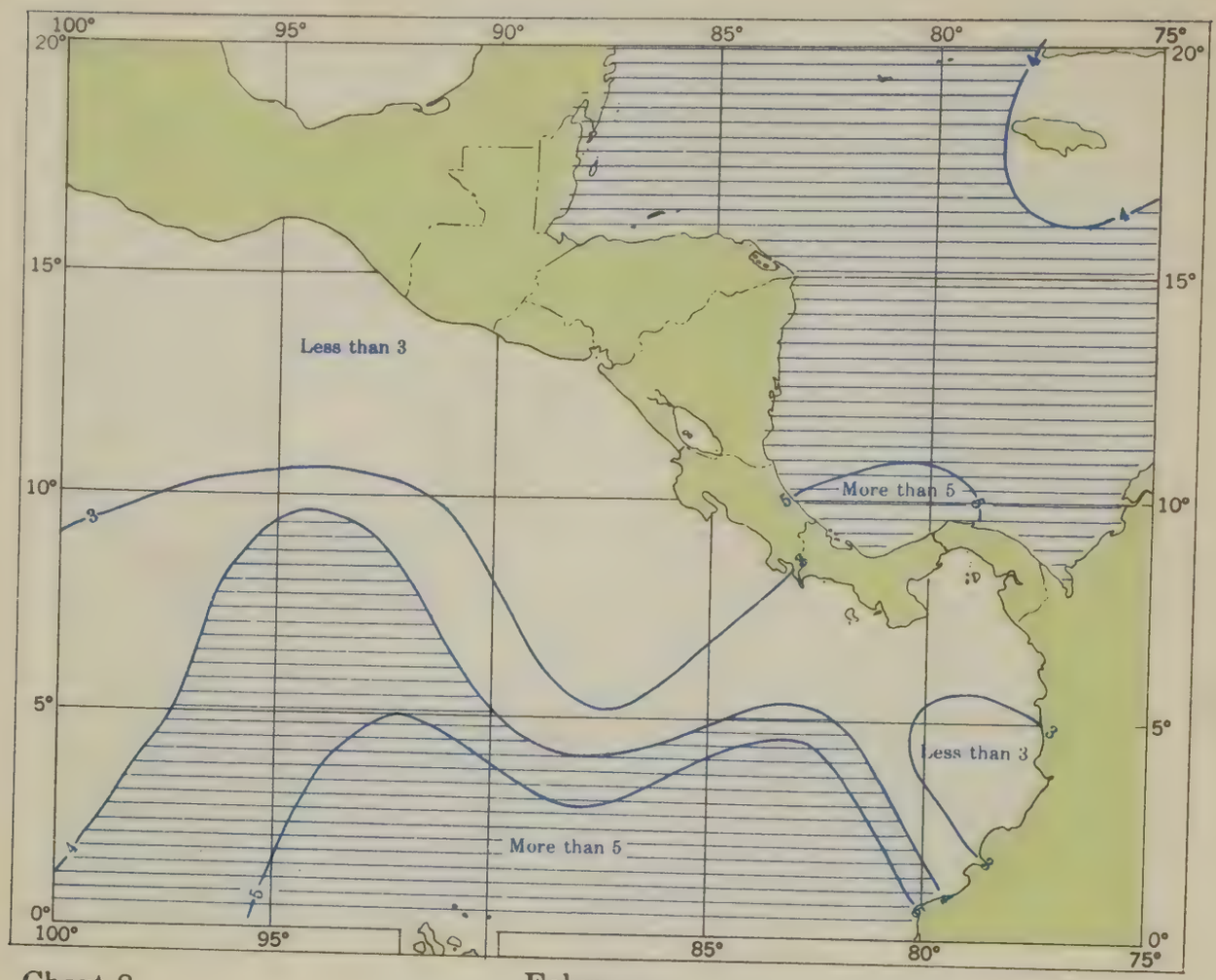


Chart 8. February
Average Cloudiness.

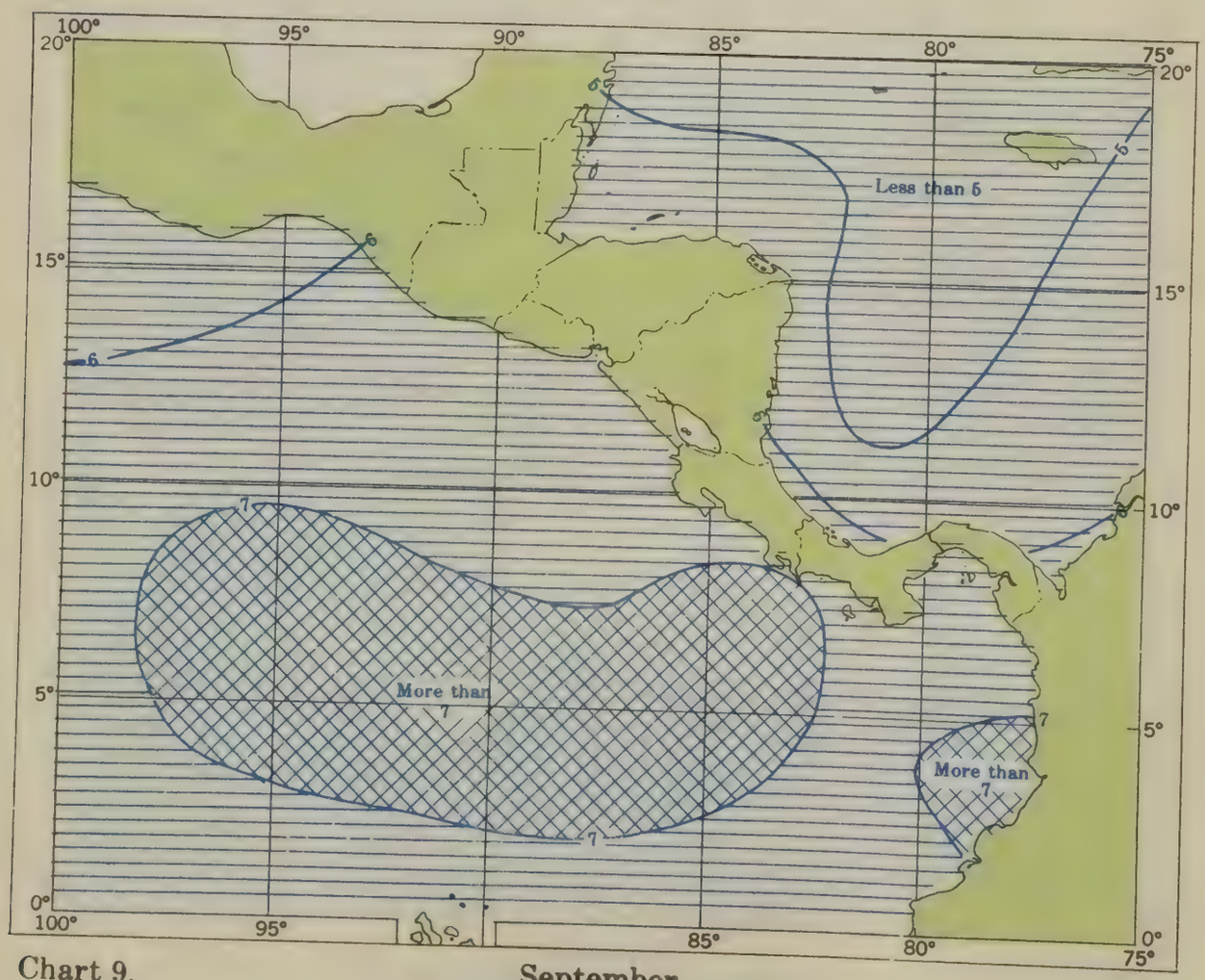


Chart 9. September
Average Cloudiness.

Fog is rare over the ocean in this area. The frequency of fog on land is shown in some of the meteorological tables for the specific localities. Gales are usually connected with tropical storms or northers, which have been treated elsewhere. However, strong winds and gales occur occasionally over restricted areas as accompaniments of thunderstorms of the more violent type.

Upper air winds over Central America.—The upper air wind data presented herewith are based on a 5-year record (1928–32) of pilot balloon observations made at Managua, Nicaragua, and Coco Solo, Canal Zone, respectively.

On the basis of monthly characteristics as evident from the original tabulation of the data, the year has been divided into a summer season, including the months of June to November, inclusive, and a winter season including the remaining months of December to May.

Data are shown for the levels: Surface, 1,600, 3,300, 6,600, 9,800, and 13,100 feet above the surface. All wind velocities are given in knots and directions to 16 compass points. Wind roses and resultant winds are shown graphically on chart 14 and the percentage frequency of different velocities are shown in tabular form on pages 30–37.

Wind roses.—As this area lies between 7° and 18° north latitude the northeast trades are the dominant factor in the prevailing upper air winds, especially in the northern part of the area. Over the southern portion of the area, however, the northward movement of the "Doldrums" during the summer months results in a marked increase in the frequency of southerly and westerly winds in the lower levels as shown by the records at Coco Solo. The Managua records also show a similar condition but to a much less extent. For example, during the summer season, the percentage of winds at 1,600 feet having easterly (NNE. to SSE.+½ N.+S.) and westerly (NNW. to, SSW.+½ N.+S.) components, respectively, are 49 and 51 for Coco Solo and 89 and 11 for Managua. At Managua the prevailing winds during both seasons shift from ESE. at the surface to ENE. at 1,600 feet and remain in that direction up to about 13,000 feet where there is a shift again to E. At Coco Solo the prevailing direction at the surface is SE. during the summer season and NNE. during the winter season. At 1,600 and 3,300 feet the prevailing directions are NNE. during both seasons shifting at 6,600 feet to ENE. and E. during the summer season and to NE. during the winter season. At 9,800 feet the prevailing direction is E. during the summer season and NE. during the winter season while at 13,000 feet it is E. during both seasons. The consistency with which the winds blow from the prevailing directions are shown in table 2 in which are given the total percentage frequencies of winds from the three adjacent directions having the highest percentage frequency of occurrence.

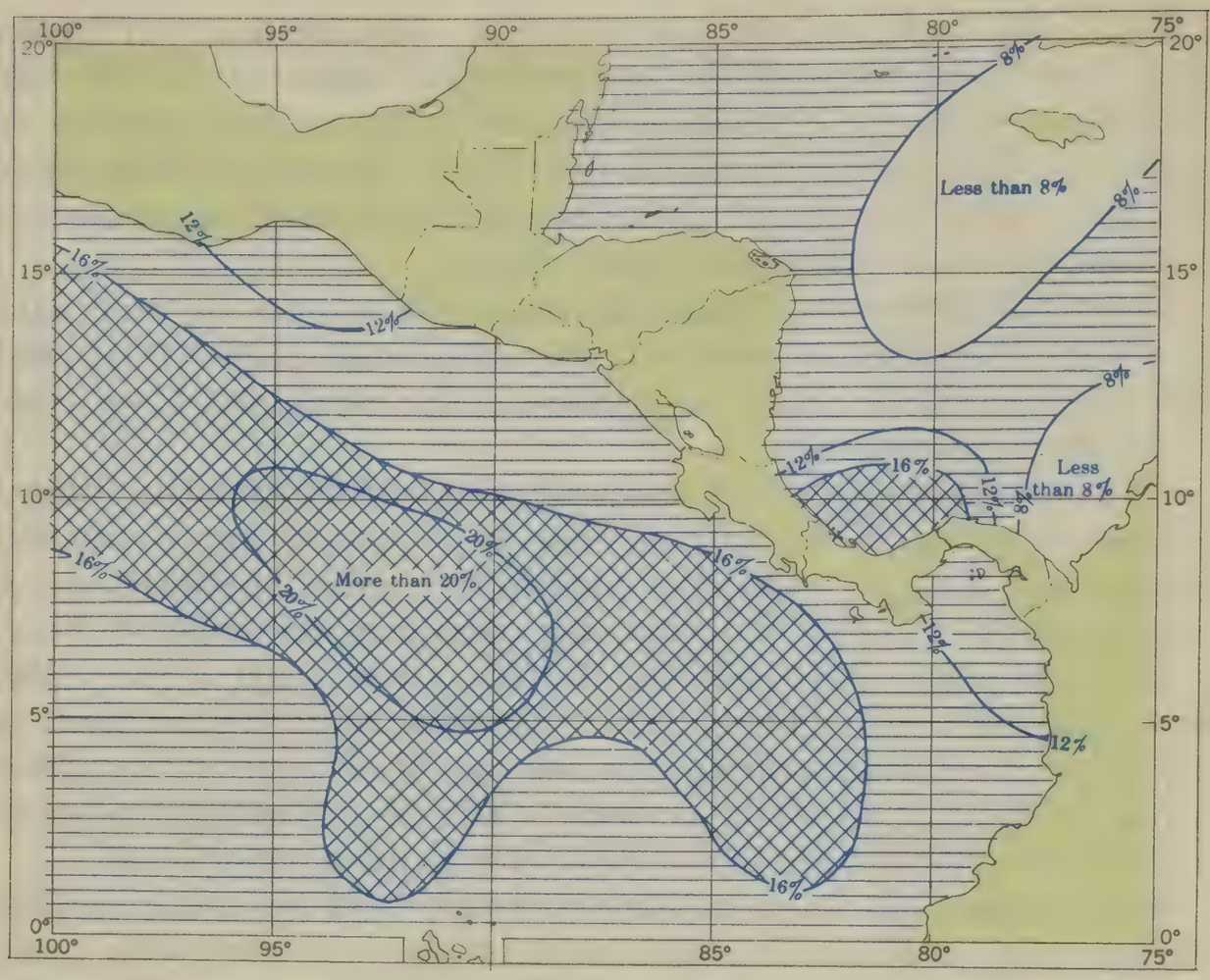


Chart 10. February
Exceptional Visibility.

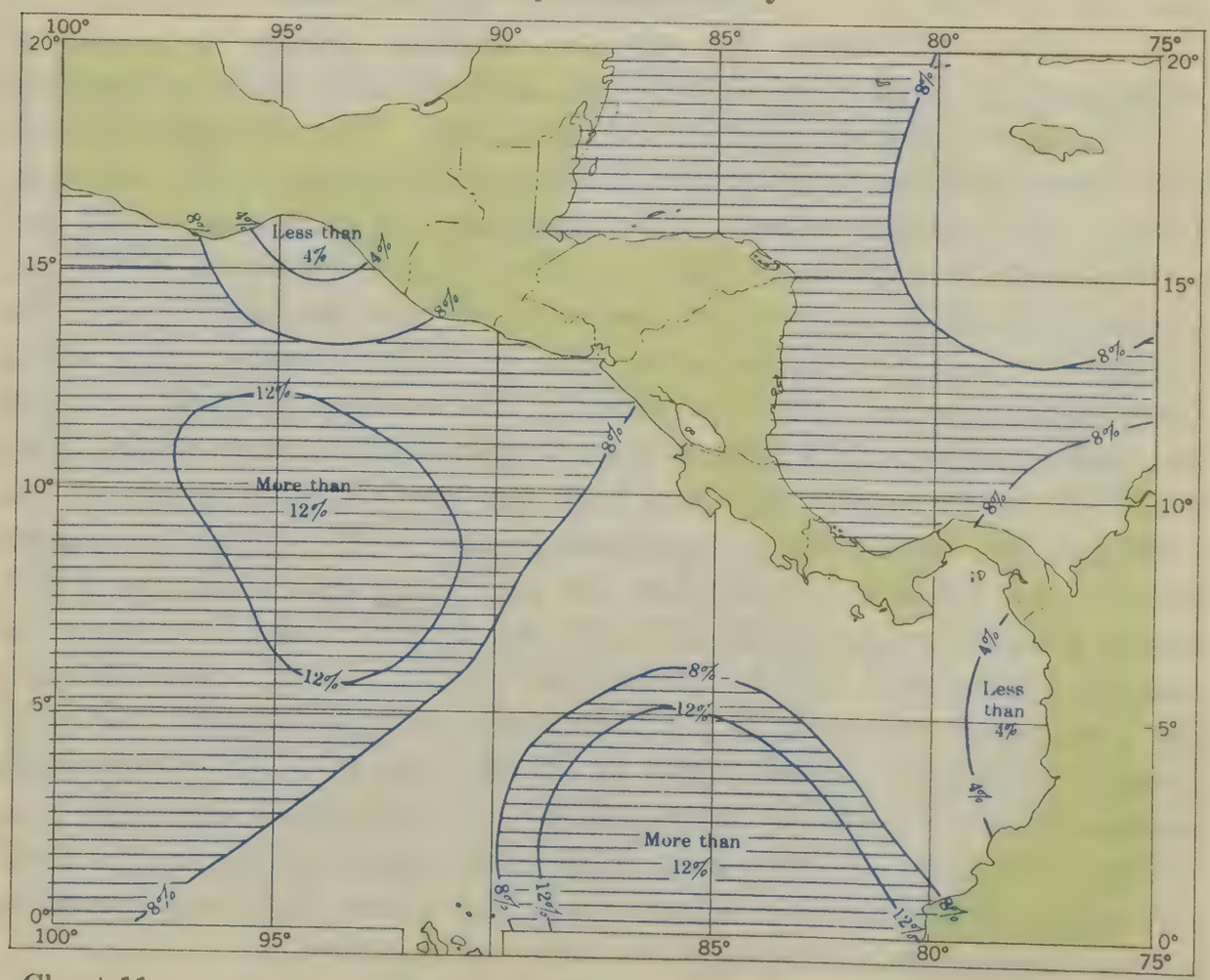


Chart 11. September
Exceptional Visibility.

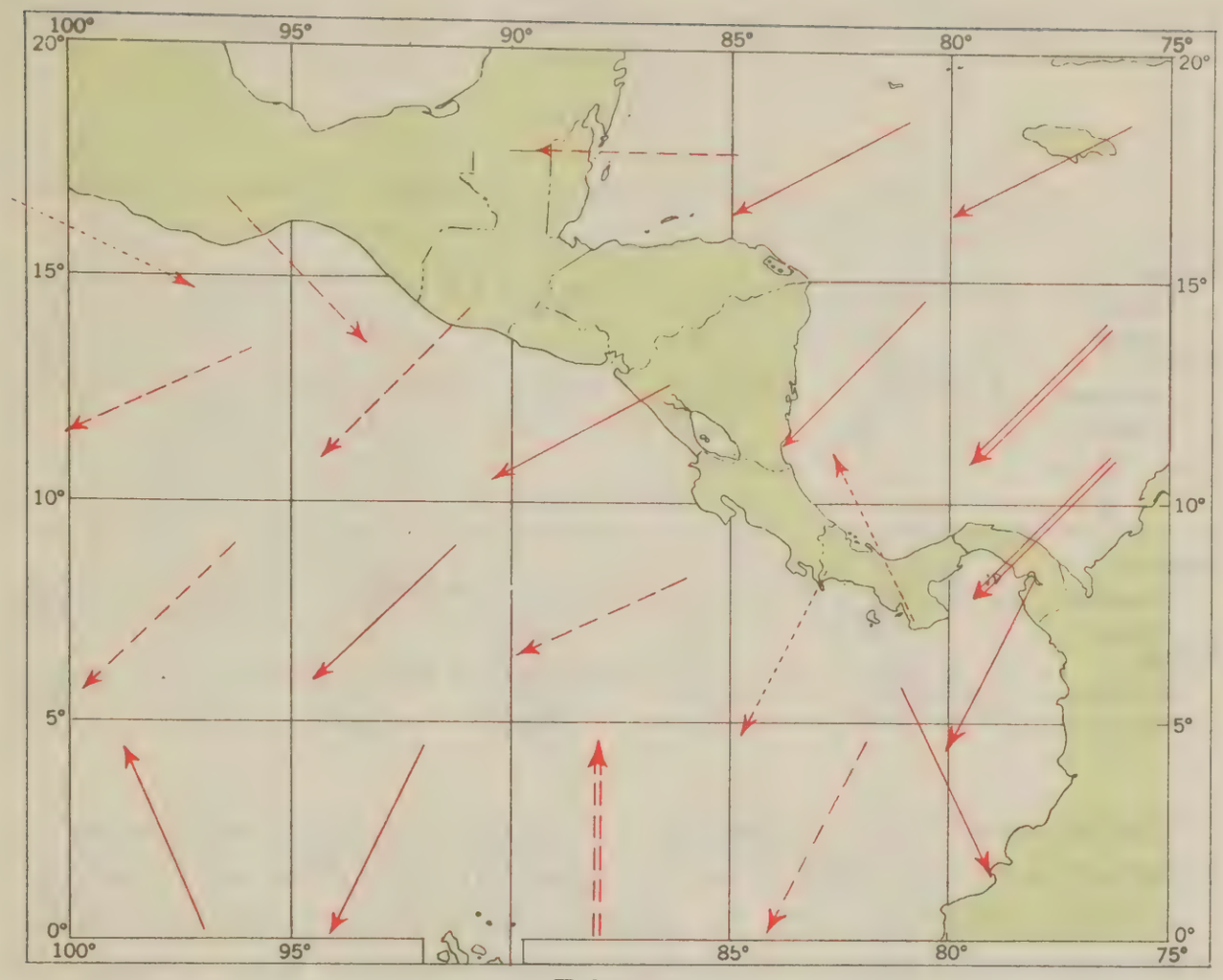


Chart 12. February
Direction of Middle Cloud Movement.

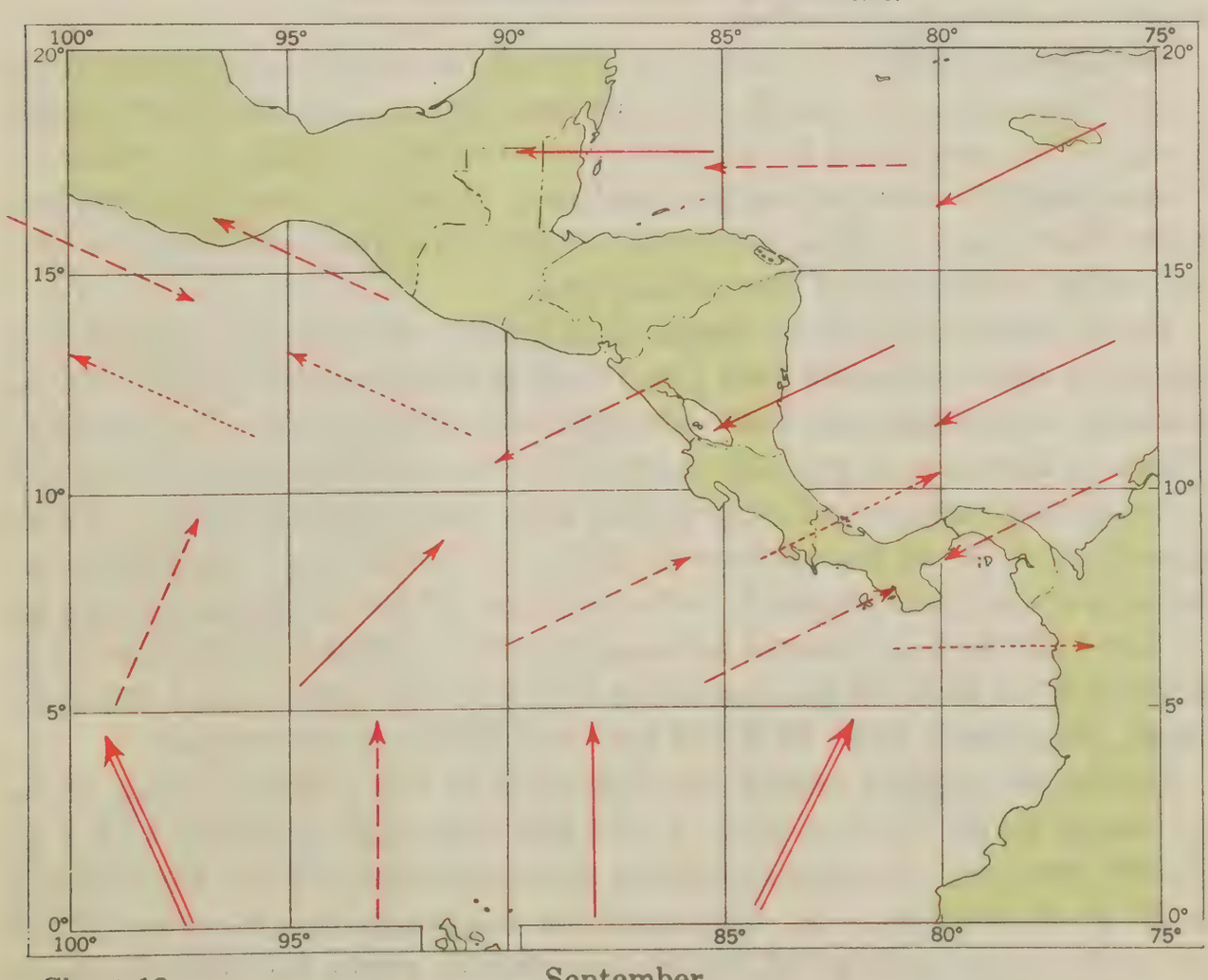


Chart 13. September
Direction of Middle Cloud Movement.

TABLE 2.—*Total percentage frequency of winds from the 3 adjacent prevailing directions*

COCO SOLO

	Surface	1,600 feet	3,300 feet	6,600 feet	9,800 feet	13,100 feet
Summer:						
Direction	SE.-SSE.-S.	N.-NNE.-NE.	N.-NNE.-NE.	NE.-ENE.-E.	ENE.-E.-ESE.	ENE.-E.-ESE.
Percent	30	33	42	50	53	48
Winter:						
Direction	N.-NNE.-NE.	N.-NNE.-NE.	N.-NNE.-NE.	N.-NNE.-NE.	NNE.-NE.-ENE.	NE.-ENE.-E.
Percent	68	81	78	54	47	40

MANAGUA

Summer:						
Direction	E.-ESE.-SE.	NE.-ENE.-E.	NE.-ENE.-E.	NE.-ENE.-E.	ENE.-E.-ESE.	ENE.-E.-ESE.
Percent	66	80	81	77	61	56
Winter:						
Direction	E.-ESE.-SE.	ENE.-E.-ESE.	NE.-ENE.-E.	NE.-ENE.-E.	NE.-ENE.-E.	ENE.-E. ESE.
Percent	76	91	94	84	54	44

The increase in the frequency of westerly winds or "antitrades" is apparent at the two highest levels; especially during the winter season.

Average velocities are, in general, highest from the prevailing directions and higher during the winter months than during the summer months. Except at the surface the velocities are higher at Managua than at Coco Solo.

Resultant winds.—In computing resultant winds, each individual wind observation is considered as a force vector and all observations involved are combined by adding these vectors to obtain one value or vector which is recorded as the resultant. Resultant winds, therefore, when based on a sufficient number of frequent observations, give the true *mass* movement of the atmosphere.

From table 3, it will be noted that during the summer season, the resultant air movement over Coco Solo is comparatively light due to variable directions and low velocities obtaining during that season. There is, however, a gradual increase in velocity with height from 1.2 knots at the surface to 7.2 at 13,000 feet, the direction shifting clockwise from NW. at the surface to ESE. at 13,000 feet. At Managua, there is a marked increase in velocity from 3.4 knots at the surface to 17.5 at 6,600 feet and then a decrease to 8.3 at 13,000 feet; the direction shifting from ESE. at the surface to ENE. at the 1,600- and 3,300-foot levels, then back to E. at 9,800 feet and ESE. at 13,000 feet.

During the winter season the velocities at Coco Solo increase from 8.1 knots at the surface to 14.3 at 1,600 feet, then decrease to 5.3 at 13,000 feet; the directions shifting clockwise from N. at the surface to E. at 13,000 feet. At Managua the resultant directions are E. at the surface and again at 13,000 feet and ENE. at the four intermediate levels. The velocities increase rapidly from 5.6 knots at the surface

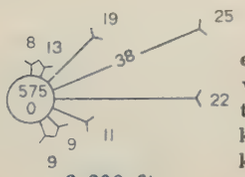
Chart 14.
Surface and Upper Air Wind Roses for Managua, Nicaragua and Coco Solo, C.Z.



DESCRIPTION OF WIND ROSES IN UPPER AIR AND SURFACE CHARTS

In Part I, Chart 14 displays roses of average winds in the upper air for specific levels, i.e. surface, and various levels in the upper air. These roses are shown in blue, the level indicated by heights beneath roses. The surface observations in these cases were taken at the same places and times as the pilot ballon observations on which upper air wind roses are based.

The arrows fly *with* the wind and their length, measured on the attached scale, from the outside of the circle, gives the percentage of times the wind was observed to blow from or near the given point. The figures at the beginning of the arrows show the average speed in knots. In the center of the circles, the upper figures givethe number of observations upon which the roses were constructed and the lower figures give the percentage of calms and winds of less than 1 knot. Where the percentage of frequency of the winds was less than 2 percent no arrow is shown. In some instances the full length of the arrow could not be shown and the line was therefore, broken and the total percentage given between the broken lines.



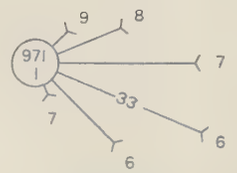
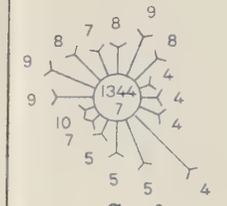
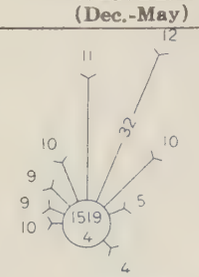
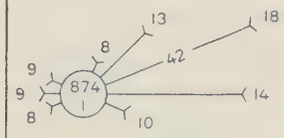
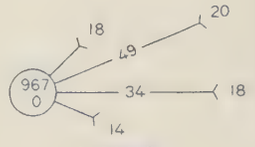
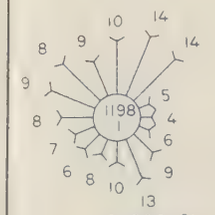
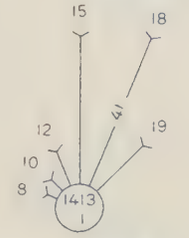
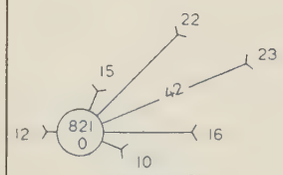
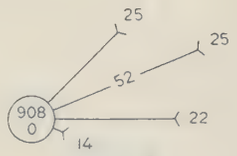
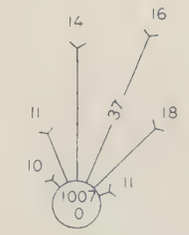
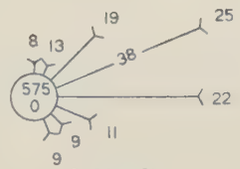
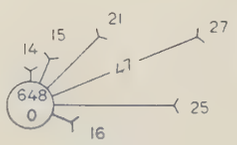
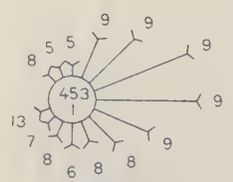
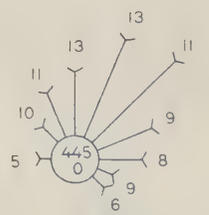
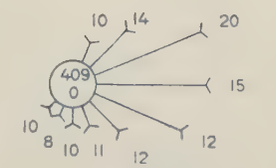
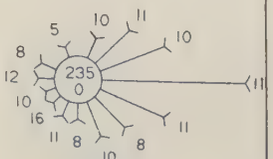
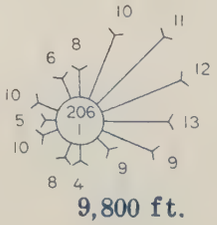
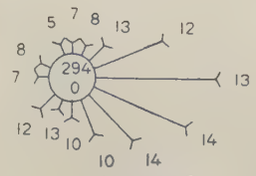
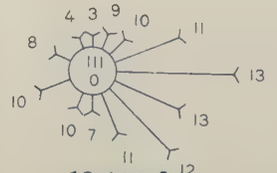
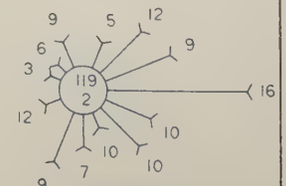
6,600 ft.

Wind Rose at 6,600 Feet.— For example:

The attached wind rose should be interpreted thus with reference to scale of wind percentages below; In each 100 observations there will be found 2 from N, with an average speed of wind from that direction of 8 knots; 2 from N.N.E., average speed 13 knots; 12 from N.E., 19 knots; 38 from E.N.E., 25 knots; 27 from E., 22 knots; 7 from E.S.E., 11 knots; 3 from S.E., 9 knots; 3 from S.S.E., 9 knots; 575 observations; percentage of calms 0.



SCALE OF WIND PERCENTAGES

MANAGUA, NICA.		COCO SOLO, C.Z.	
SUMMER (June-Nov.)	WINTER (Dec.-May)	SUMMER (June-Nov.)	WINTER (Dec.-May)
 Surface	 Surface	 Surface	 Surface
 1,600 ft.	 1,600 ft.	 1,600 ft.	 1,600 ft.
 3,300 ft.	 3,300 ft.	 3,300 ft.	 3,300 ft.
 6,600 ft.	 6,600 ft.	 6,600 ft.	 6,600 ft.
 9,800 ft.	 9,800 ft.	 9,800 ft.	 9,800 ft.
 13,100 ft.	 13,100 ft.	 13,100 ft.	 13,100 ft.

to 22.6 at 3,300 feet, then decrease slightly to 21.4 at 6,600 feet and then to 10.1 at 9,800 feet and 6.3 at 13,000 feet.

TABLE 3.—*Resultant winds*

[Directions in degrees from N. (N.=360°, E.=90°, S.=180° etc.)]

SUMMER

Station	Surface			1,600 feet			3,300 feet			6,600 feet			9,800 feet			13,100 feet		
	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations
	°	*Knots*	*No.*	°	*Knots*	*No.*	°	*Knots*	*No.*	°	*Knots*	*No.*	°	*Knots*	*No.*	°	*Knots*	*No.*
Coco Solo	321	1.2	1,344	4	2.8	1,198	40	3.6	891	82	5.0	453	98	6.2	235	108	7.2	111
Managua	109	3.4	892	71	12.1	874	63	16.9	821	75	17.5	575	86	10.4	409	105	8.3	294

WINTER

Coco Solo	11	8.1	1,519	16	14.3	1,413	18	12.8	1,007	27	7.8	445	60	5.4	206	96	5.3	119
Managua	100	5.6	971	76	17.6	967	68	22.6	908	69	21.4	648	75	10.1	375	84	6.3	218

Average velocities.—In tables 4 and 5, average velocities in knots are shown by months and by seasons, respectively. These values are obtained simply by dividing the sum of all velocities for each level by the corresponding total number of observations and include the winds from all directions.

TABLE 4.—*Average velocities (in knots) by months*

COCO SOLO

Altitude	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
13,100 feet	10.1	11.2	7.2	7.4	11.6	10.9	14.4	12.0	10.7	9.5	13.2	11.4
9,800 feet	10.9	10.7	8.0	9.3	9.5	9.5	13.8	10.1	10.9	8.7	12.0	10.7
6,600 feet	12.4	11.5	9.9	9.5	8.0	7.6	9.9	8.9	8.2	7.4	10.3	11.8
3,300 feet	17.3	17.7	14.0	13.6	8.9	7.4	8.7	8.2	8.0	7.2	12.4	15.7
1,600 feet	18.8	18.0	15.7	14.9	10.1	8.4	11.3	9.5	8.5	8.5	13.4	17.1
Surface	10.9	11.4	9.9	9.9	7.2	5.6	6.4	6.0	5.6	5.6	8.2	9.7

MANAGUA

13,100 feet	12.4	11.4	11.6	10.1	8.9	10.5	13.6	14.2	12.2	10.5	12.2	11.4
9,800 feet	18.2	13.4	10.9	11.5	9.7	8.5	16.5	17.8	11.6	10.9	16.1	21.6
6,600 feet	30.0	24.8	19.2	21.6	15.3	12.6	26.0	24.0	15.9	14.4	24.2	30.4
3,300 feet	27.2	26.2	22.1	21.4	17.3	15.1	24.2	22.5	15.3	15.1	21.6	28.1
1,600 feet	21.9	21.2	18.2	16.7	13.0	11.2	18.6	17.3	10.7	10.7	14.9	20.2
Surface	6.8	6.8	7.0	7.2	5.6	3.9	5.8	5.4	3.5	2.9	4.3	5.6

It will be seen from tables 4 and 5 that in general the lowest velocities occur during the months of June and September and the highest velocities during the months of December to February, inclusive. There is, however, a secondary period of high velocities during July and August which is very marked at Managua but only slightly in

evidence at Coco Solo. This increase in velocity is apparently due to a steepening of the pressure gradient brought about by a general rise in pressure to the north and east of this area. (See the diagram on p. 5.) Additional evidence indicating that this increase in velocity is dependent upon the usual pressure rise to the north during these months is found in the fact that the increase failed to show up in July 1931 and that an examination of the mean pressures for stations to the north and east showed a corresponding failure of the pressure to rise during that month. A tabulation of these pressures is given in table 6.

TABLE 5.—*Average velocities for the summer (June to November) and winter (December to May) seasons*

	Surface		1,600 feet		3,300 feet		6,600 feet		9,800 feet		13,100 feet	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Coco Solo:												
Knots	6.2	9.7	9.7	15.9	8.5	14.4	8.5	10.5	10.5	9.9	11.3	10.1
Number of observations	1,344	1,519	1,198	1,413	891	1,007	453	445	235	206	111	119
Managua:												
Knots	4.5	6.6	14.2	18.4	19.4	23.6	19.8	23.0	13.6	13.8	12.0	10.9
Number of observations	892	971	874	967	821	908	575	648	409	375	294	218

TABLE 6.—*Mean station pressures for period 1928–32 compared with those for 1931*

	May	June	July	August	September	October
San Juan, P. R.:						
1928–35	29.89	29.91	29.93	29.90	29.84	29.83
1931	29.84	29.90	29.88	29.92	29.84	29.85
Kingston, Jamaica:						
1928–35	29.92	29.91	29.93	29.92	29.87	29.86
1931	29.87	29.91	29.90	29.92	29.86	29.85
Key West, Fla.:						
1928–35	29.96	29.95	30.00	29.97	29.90	29.94
1931	29.93	29.97	29.95	30.01	29.93	29.95
New Orleans, La.:						
1928–35	29.94	29.91	29.96	29.96	29.92	29.99
1931	29.92	29.96	29.91	30.01	29.96	30.01
Galveston, Texas:						
1928–35	29.92	29.89	29.95	29.94	29.91	29.98
1931	29.94	29.96	29.90	30.00	29.96	30.00

Over Central America during this same period the average fluctuation in monthly mean pressures during the summer months was comparatively small as compared with the stations farther to the north. The mean station pressures for San Salvador and Cristobal, Canal Zone, are shown in table 7 as an illustration of this fact.

Frequency of Rain and Drizzle, Thunderstorms and Squalls.

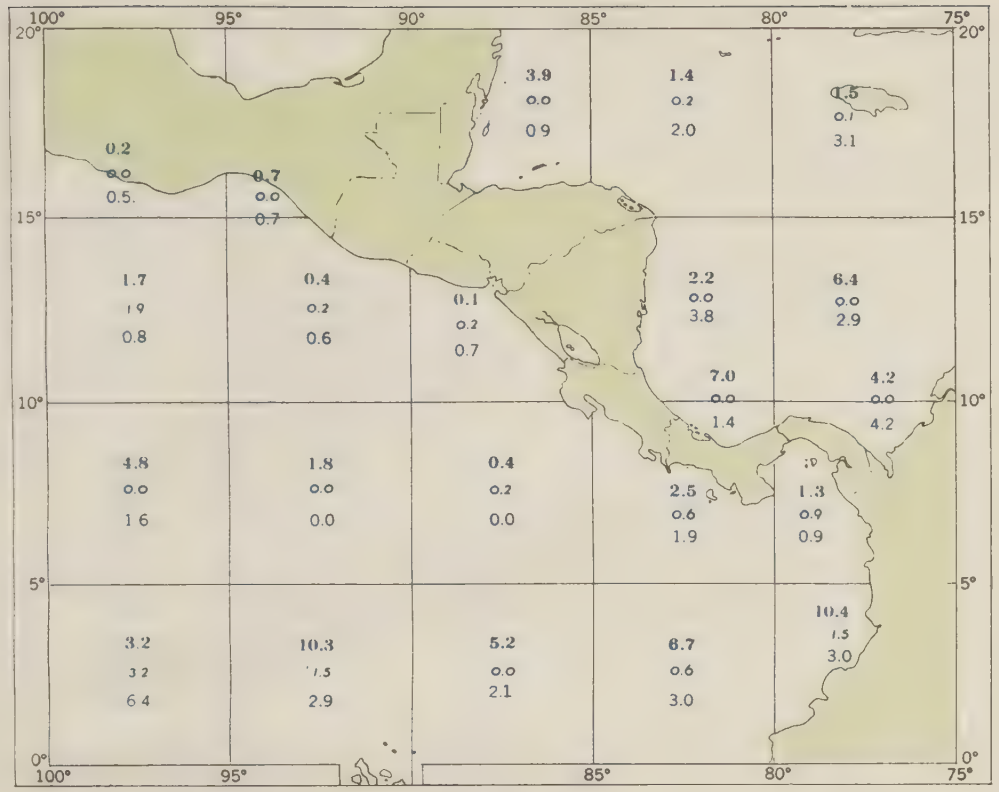


Chart 15. February

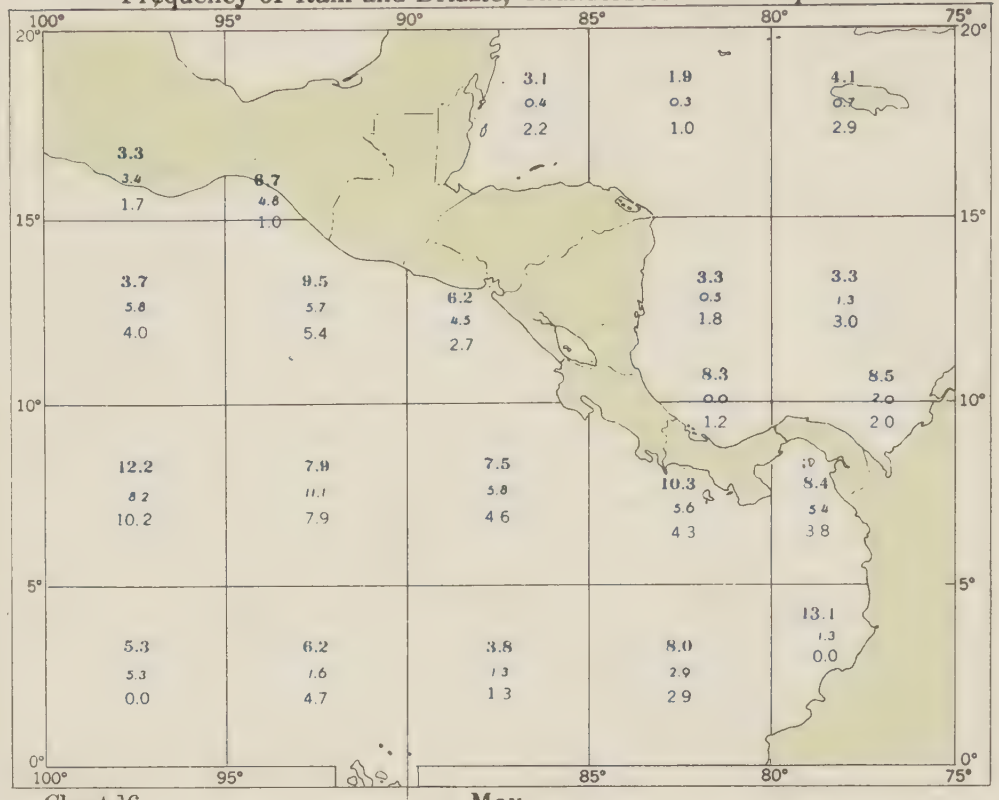


Chart 16. May

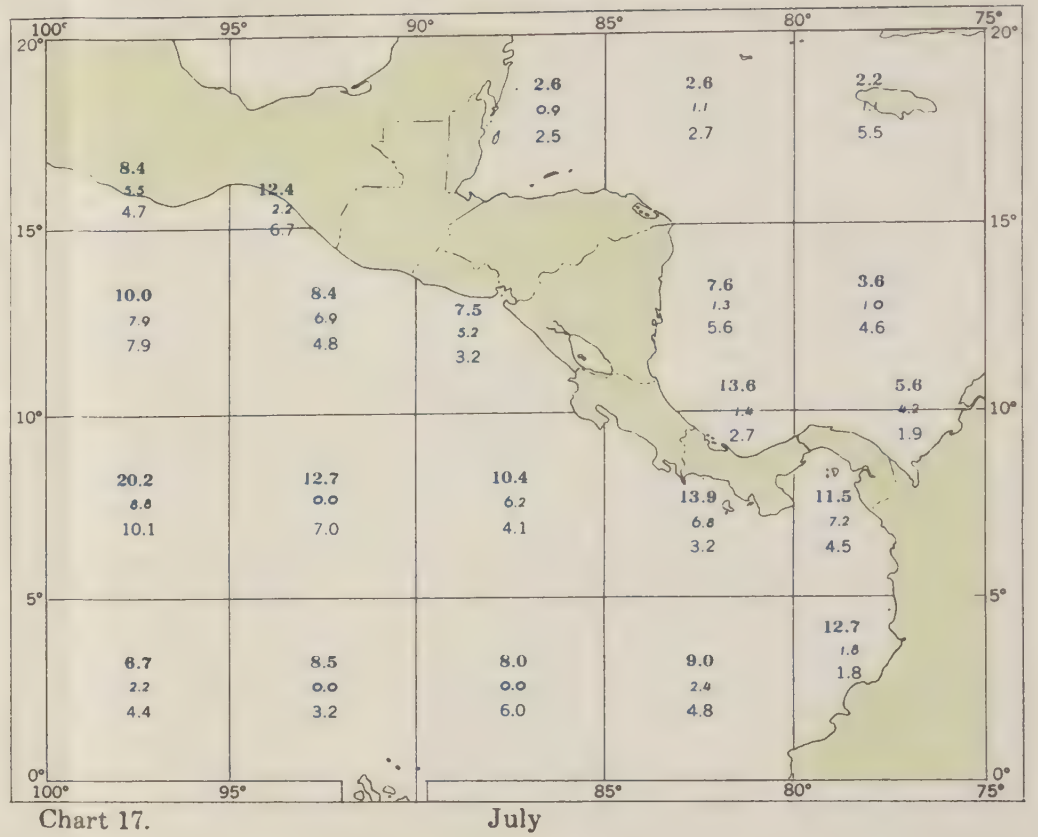


Chart 17. July

The upper figure (**bold face**) in each square is the percentage of rain or drizzle.
The middle figure (*italics*) is the percentage of thunderstorms,
The lower figure (light face) is the percentage of squalls.

The figures are the percentages, in whole numbers and tenths, of the observations taken on shipboard at noon, G.C.T. (1880-1933) which recorded each of these elements.

For example: In the 5° square 0° to 5° N., 80° to 85° W. in the month of February, sixth and seven tenths per cent of all recorded observations showed rain or drizzle, six tenths of one percent recorded thunder storms and three percent recorded squalls.

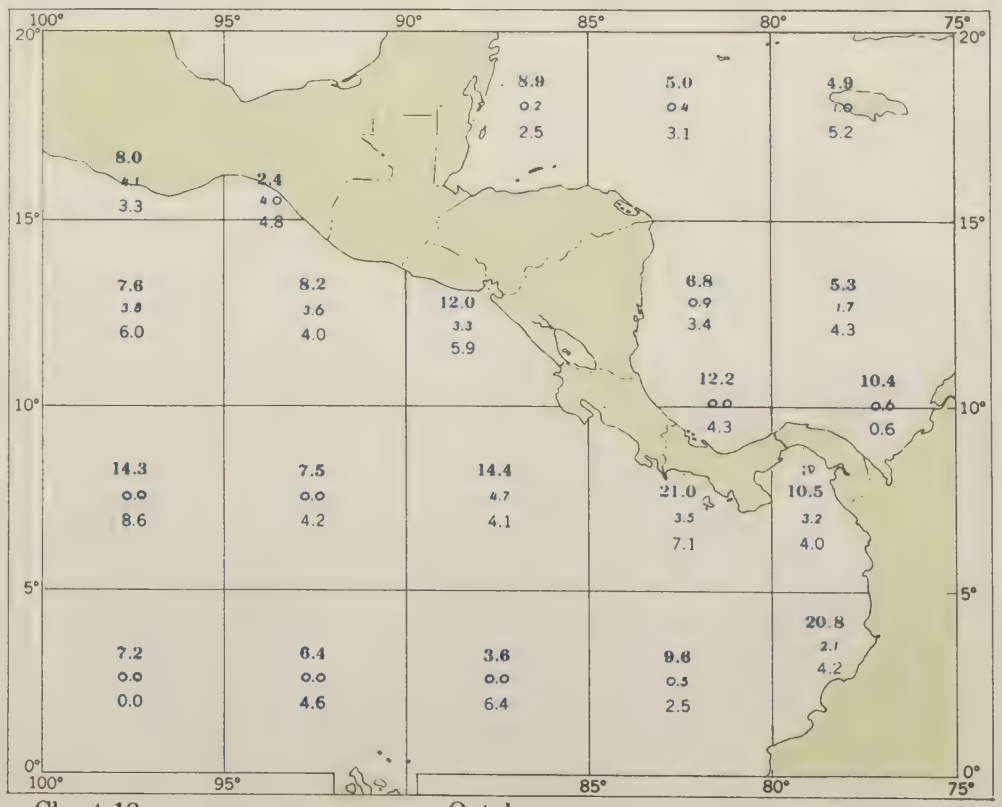


Chart 18. October

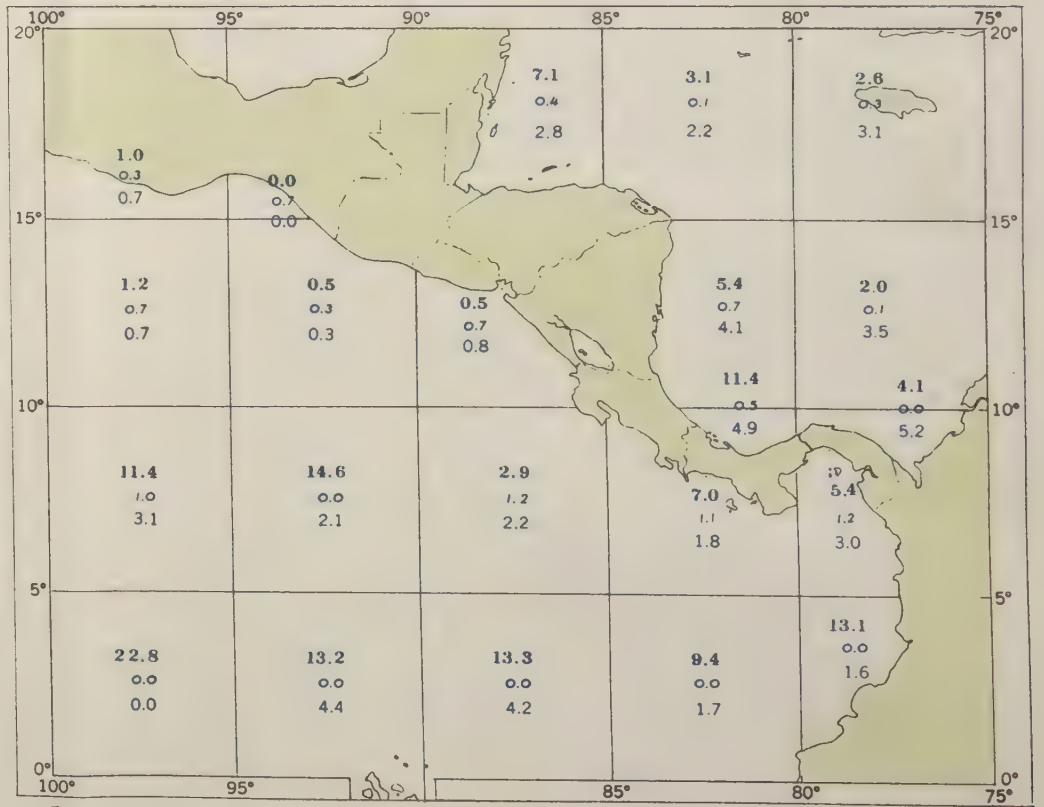


Chart 19. December

TABLE 7.—*Mean station pressures for the period 1928–32, inclusive*

	May	June	July	August	September	October
San Salvadar	27. 67	27. 65	27. 67	27. 68	27. 66	27. 66
Cristobal	29. 84	29. 83	29. 82	29. 84	29. 82	29. 82

It will be noted further from the above tabulation of monthly velocities that the height at which the maximum velocities occur varies from approximately 2,000 feet at Coco Solo to approximately 6,000 feet at Managua. Above these respective levels the velocities decrease to a minimum at 12,000 or 13,000 feet during the winter months at Coco Solo and during all months at Managua. During the summer months at Coco Solo, however, the minimum velocities are reached at an altitude of about 3,000 or 4,000 feet. Above these levels of minimum velocities there is a gradual increase in velocity with height.

Velocity frequencies.—In table 8, the percentage frequency of the occurrence of different velocities, average velocities for each direction, and the number of observations for each level are shown for the two stations by seasons.

From an examination of the total percentages by levels it will be seen that for both seasons and all levels light winds of 3 knots or less range from 1 to 21 percent at Coco Solo and from 1 to 32 percent at Managua. In the next group (4–14 knots) the range is from 40 to 85 at Coco Solo and from 13 to 92 at Managua. In the velocity group of 15 to 28 knots the range at Coco Solo is from 4 at the surface during the summer season to 57 at 1,600 feet during the winter season while at Managua the range is from 0.2 at the surface during the summer season to 68 at 1,600 feet during the winter season. In the next group (29–41 knots) the percentage range is only 0 to 2 at Coco Solo, but 0–32 at Managua. Winds of more than 41 knots were recorded during this 5-year period only once at Coco Solo but occurred more frequently at Managua; amounting to 6 percent at 6,600 feet during the winter season.

TABLE 8.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity in knots for each direction*

COCO SOLO, C. Z.

JUNE-NOVEMBER

	Surface (46 feet)						1,600 feet						3,300 feet					
	4-14	15-28	29-41	Over 41	Total percent	Average velocity	4-14	15-28	29-41	Over 41	Total percent	Average velocity	4-14	15-28	29-41	Over 41	Total percent	Average Velocity
N	4.3	0.5			4.8	8.4	8.1	1.4			9.5	9.9	8.4	1.1			9.5	8.6
NNE	6.6	1.0			7.6	9.3	7.3	4.8	0.1		12.2	13.6	13.8	3.0			16.8	10.1
NE	4.5	.4			4.9	7.8	5.0	5.4	.1		10.5	14.0	9.8	3.7			13.5	10.7
ENE	1.9				1.9	4.1	.8	.2			1.0	5.2	6.6	.7			7.3	8.9
E	1.6				1.6	3.9	1.3				1.3	4.1	3.9	.1			4.0	7.0
ESE	2.8				2.8	3.9	2.2				2.2	6.0	3.3	.2			3.5	7.2
SE	10.2				10.2	4.1	3.8	.9			4.7	8.7	4.4	.5			4.9	7.6
SSE	7.2	.2			7.4	5.0	4.8	3.0	.2		8.0	12.8	5.3	.3			5.6	7.0
S	4.4	.1			4.5	5.4	2.9	.6	.1		3.6	9.7	4.5	.6	0.1		5.2	8.7
SSW	2.2	.1			2.3	5.4	1.9	.4			2.3	8.2	2.8	.3	.2		3.3	10.1
SW	1.9				1.9	7.0	3.8	.1			3.9	6.0	1.1				1.1	5.0
WSW	1.7	.1		0.1	1.9	9.7	3.5	.3			3.8	7.4	2.3	.1			2.4	6.8
W	6.5	.7			7.2	8.9	5.4	.2			5.6	8.4	1.1	.4			1.5	6.8
WNW	9.2	.2			9.4	9.1	8.3	.4			8.7	8.7	2.1	.4			2.5	6.2
NW	6.2	.1			6.3	7.6	8.9	.3			9.2	7.8	3.0	.1			3.1	5.8
NNW	4.7	.1			4.8	7.2	6.4	.7			7.1	8.9	6.1	.4			6.5	7.4
Total, percent	75.9	3.5		.1	79.5		74.4	18.7	.5		93.6		78.5	11.9	.3		90.7	
	Number of observations, 1,344; percent, 0-3 knots, 20.5						Number of observations, 1,198; percent, 0-3 knots, 6.4						Number of observations, 891; percent, 0-3 knots, 9.3					

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	1.6	0.2			1.8	5.4							0.9				0.9	2.9
NNE	6.6	.2			6.8	8.6	3.4		0.4		3.8	10.3	2.7				2.7	9.1
NE	10.2	1.1			11.3	8.9	7.2	1.7			8.9	10.7	2.7	0.9			3.6	10.5
ENE	15.0	1.8			16.8	9.1	10.2	2.6			12.8	10.3	10.8	2.7			13.5	11.1
E	16.8	.9			17.7	9.1	19.6	6.4	.4		26.4	11.4	15.4	5.4			20.8	13.4
ESE	10.8	.5			11.3	8.8	8.5	3.8			12.3	11.2	8.1	5.4			13.5	12.6
SE	6.4	.2			6.6	7.6	6.4	1.7			8.1	8.2	11.7	4.5			16.2	11.8
SSE	3.5	.2			3.7	8.4	6.0	.9			6.9	10.5	5.4	2.7			8.1	10.9
S	2.9				2.9	6.2	2.1				2.1	8.4	2.7				2.7	7.2
SSW	2.9				2.9	7.6	2.1	1.3			3.4	10.9	.9	.9			1.8	10.3
SW	1.5	.2			1.7	6.6	1.3	.4	.4		2.0	15.9	.9				.9	3.9
WSW	1.1	.9			2.0	13.4	.9	.4			1.3	10.1	4.5	.9	0.9		6.3	10.5
W	.5	.4			.9	9.3	2.1	.9			3.0	11.6		.9			.9	21.4
WNW	1.5				1.5	6.4	2.1	.4			2.5	7.6	1.8	.9			2.7	8.4
NW	1.5				1.5	8.2												
NNW	1.8				1.8	5.4	1.3				1.3	4.8	1.8				1.8	3.9
Total, percent	84.6	6.6			91.2		73.2	20.5	1.2		94.9		70.3	25.2	.9		96.4	
	Number of observations, 453; percent, 0–3 knots, 8.8						Number of observations, 235; percent, 0–3 knots, 5.1						Number of observations, 111; percent, 0–3 knots, 3.6					

TABLE 8.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity in knots for each direction*—Con.

COCO SOLO, C. Z.

DECEMBER–MAY

	Surface (46 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	18.5	4.1			22.6	11.5	11.9	15.1	0.3		27.3	15.2	15.1	9.3			24.4	13.8
NNE	21.2	9.9			31.1	12.0	11.0	30.6	.7		42.3	18.2	13.5	23.0	0.2		36.7	16.5
NE	10.3	2.3			12.6	10.1	2.7	9.1	.6		12.4	19.2	5.1	11.1	.6		16.8	17.6
ENE	1.6	.4			2.0	5.4	.4	.2			.6	10.1	1.3	.9			2.2	11.5
E	.6				.6	3.3	.2				.2	5.8	.6				.6	6.8
ESE	.7				.7	3.1	.2				.2	4.8	.6				.6	5.6
SE	1.7				1.7	4.5	.6				.6	7.0	.5				.5	4.5
SSE	.9				.9	3.9	1.1	.1			1.2	8.9	.4	.1			.5	7.2
S	.5				.5	3.9	.6				.6	5.2	.7				.7	7.2
SSW	.3				.3	3.9	.5				.5	8.5	.7				.7	7.0
SW	.5				.5	7.4	.4				.4	5.2	.4				.4	9.3
WSW	.7				.7	7.4	.4				.4	5.4	.1				.1	3.9
W	1.7	.3			2.0	10.5	.9	.2			1.1	8.9	1.2				1.2	5.4
WNW	2.2	.3			2.5	9.3	1.8	.1			1.9	8.0	.4				.4	5.8
NW	4.5	.2			4.7	9.3	2.4	.2			2.6	9.5	2.0	.2			2.2	9.5
NNW	7.4	.4			7.8	9.7	5.0	1.8			6.8	12.2	7.9	1.9			9.8	11.3
Total, percent	73.3	17.9			91.2		39.9	57.4	1.6		98.9		50.5	46.5	.8		97.8	
	Number of observations, 1,519; percent, 0–3 knots, 8.8						Number of observations 1,413; percent, 0–3 knots, 1.1						Number of observations 1,007; percent, 0–3 knots, 2.2					

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	9.0	3.4			12.4	12.8	4.3				4.3	7.8	0.9				0.9	3.9
NNE	12.8	7.6	0.2		20.6	13.0	9.7	2.9			12.6	9.9	2.5	0.9			3.4	5.2
NE	16.6	4.5	.2		21.3	10.7	13.1	3.4			16.5	11.3	7.6	3.4			11.0	12.0
ENE	9.9	.7			10.6	8.9	12.1	2.9			15.0	11.7	10.9	2.5			13.4	9.3
E	7.4				7.4	8.2	7.8	2.4	0.5		10.7	12.6	7.6	6.7	1.7		16.0	16.3
ESE	2.7				2.7	8.6	7.3	1.4			8.7	8.8	9.2				9.2	10.0
SE	2.2				2.2	5.8	3.4				3.4	8.5	9.2	.8			10.0	9.7
SSE	.5				.5	3.9	1.5				1.5	7.8	1.7				1.7	9.7
S	.9				.9	6.2	3.4				3.4	4.5	3.4	.8			4.2	7.0
SSW	.7				.7	5.4	2.9				2.9	7.8	7.6		.8		8.4	8.7
SW	1.1				1.1	5.0	1.0	.5			1.5	16.9	.8				.8	9.7
WSW	.9				.9	6.2	2.9				2.9	9.5	1.7	1.7			3.4	11.6
W	1.8				1.8	5.0	2.4				2.4	5.4	.8				.8	11.6
WNW	1.1				1.1	8.2	2.4	1.5			3.9	10.1	1.7				1.7	2.9
NW	2.9	.9			3.8	10.3	1.5				1.5	5.8	2.5				2.5	5.8
NNW	6.7	2.2			8.9	11.4	4.4				4.4	5.8	5.0				5.0	8.7
Total, percent	77.2	19.3	.4		96.9		80.1	15.0	.5		95.6		73.1	16.8	2.5		92.4	
	Number of observations 445; percent, 0–3 knots, 3.1						Number of observations 206; percent, 0–3 knots, 4.4						Number of observations 119; percent, 0–3 knots, 7.6					

TABLE 8.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity in knots for each direction*—Con.

MANAGUA, NICARAGUA

JUNE–NOVEMBER

	Surface (197 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	0.4				0.4	3.5	1.3				1.3	6.0	0.7	0.1			0.8	9.3
NNE	.5				.5	3.5	1.5	0.1			1.6	7.6	2.1	1.9	0.1		4.1	15.3
NE	1.2				1.2	4.8	7.0	4.5	0.3		11.8	13.4	4.0	13.3	4.1	0.3	21.7	22.2
ENE	6.5				6.5	6.8	13.2	25.6	2.5	0.1	41.4	17.9	6.0	25.7	10.0	.5	42.2	23.9
E	12.6	0.1			12.7	5.0	13.7	11.4	.3		25.4	14.0	7.1	8.2	1.2		16.5	16.5
ESE	26.0	.1			26.1	5.0	3.8	.7			4.5	9.9	2.9	.5	.1		3.5	10.1
SE	13.9				13.9	4.3	.9	.1			1.0	9.3	.6	.1			.7	7.8
SSE	2.6				2.6	3.5	.2				.2	3.5	.4				.4	8.3
S	.9				.9	2.7	.1				.1	3.9	.9	.1			1.0	9.3
SSW	.5				.5	2.7	.1	.1			.2	10.7	.4				.4	5.4
SW	.3				.3	2.1	.7				.7	7.8	.9	.4			1.3	11.3
WSW	.9				.9	2.9	1.7	.2			1.9	8.2	1.2	.1			1.3	8.9
W	.6				.6	2.7	1.7	.7			2.4	9.3	1.0	.7			1.7	12.4
WNW	.7				.7	3.9	.9	.5			1.4	9.3	1.1	.2			1.3	11.3
NW	.2				.2	2.5	.9				.9	5.8	1.2	.1			1.3	9.3
NNW	.2				.2	2.9	1.1				1.1	5.6	.5				.5	7.2
Total percent	68.0	.2			68.2		48.8	43.9	3.1	.1	95.9		31.0	51.4	15.5	.8	98.7	
	Number observations, 892; percent, 0–3; knots, 31.8						Number observations, 874; percent, 0–3; knots, 4.1						Number observations, 821; percent, 0–3; knots, 1.3					

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	1.2	0.2			1.4	8.2	1.5				1.5	9.3	1.7				1.7	7.4
NNE	1.7	.2		0.2	2.1	13.0	3.2	0.5			3.7	9.5	1.7	0.3			2.0	8.4
NE	4.5	5.0	1.4	.5	11.4	19.4	5.6	3.4	0.3	0.2	9.5	13.6	2.7	1.4	0.3		4.4	13.2
ENE	6.8	16.5	12.5	1.7	37.5	24.8	6.6	9.5	4.9	.3	21.3	19.8	9.9	3.4	.3		13.6	12.2
E	7.0	13.2	6.1	.7	27.0	22.0	12.2	6.1	1.0	.5	19.8	14.6	14.3	8.5			22.8	13.4
ESE	4.9	1.6	.2		6.7	10.9	14.0	3.9			17.9	11.8	10.9	8.2			19.1	13.6
SE	3.0	.3			3.3	8.6	5.2	2.4			7.6	12.0	7.1	4.1	.3		11.5	13.6
SSE	1.7	.7			2.4	8.8	2.9	.7			3.6	11.4	6.1	1.0			7.1	9.5
S	.3	.2			.5	7.8	2.2	.7			2.9	10.3	2.7	.7			3.4	9.5
SSW	.7				.7	10.7	1.5				1.5	7.6	.7	1.4			2.1	12.6
SW	.9	.3			1.2	11.1	1.2	.7			1.9	9.5	2.7	1.0	.3		4.0	12.0
WSW	.7	.2			.9	9.7	.2	.5			.7	9.3	.7				.7	3.9
W	.9	.2			1.1	8.9	1.0				1.0	7.8	1.7				1.7	7.4
WNW	.9	.2			1.1	7.6	1.0				1.0	4.9	2.0				2.0	8.3
NW	.3				.3	4.8	.2				.2	2.9	.3	.4			.7	7.8
NNW	.3				.3	4.8	1.5				1.5	8.2	2.0				2.0	4.9
Total percent	35.8	38.8	20.2	3.1	97.9		60.0	28.4	6.2	1.0	95.6		67.2	30.4	1.4		99.0	
	Number of observations, 575; percent, 0–3; knots, 2.1						Number of observations, 409; percent, 0–3; knots, 4.4						Number of observations, 294; percent, 0–3; knots, 1.0					

TABLE 8.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity in knots for each direction*—Con.

MANAGUA, NICARAGUA

DECEMBER–MAY

	Surface (197 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	0.3				0.3	5.2	0.1				0.1	2.9						
NNE	.6	0.1			.7	8.9	.2	0.2			.4	8.9	0.5	0.4	0.2		1.1	17.5
NE	3.8	.3			4.4	8.9	1.9	5.4	0.2		7.5	17.8	1.7	10.4	6.9	0.1	19.1	25.4
ENE	12.8	.2			13.0	7.8	9.1	35.5	3.8		48.4	20.2	4.2	28.8	18.8	.6	52.4	25.2
E	26.3	.3			26.6	6.6	9.6	22.5	1.7		33.8	17.8	4.1	14.1	4.5	.2	22.9	21.8
ESE	30.5	.1			30.6	6.4	3.3	4.1			7.4	14.4	1.0	1.1			2.1	14.4
SE	14.7	.1			14.8	5.8	.3				.3	8.3	.5				.5	4.9
SSE	2.1				2.1	6.6							.1				.1	2.9
S	.1				.1	2.5	.2				.2	4.8	.2				.2	3.9
SSW							.1				.1	3.9						
SW		.1			.1	4.7												
WSW	.1				.1	2.9	.1				.1	9.7	.3				.3	4.4
W	.2				.2	3.3	.3				.3	7.3	.2				.2	8.7
WNW	.2				.2	3.3	.4				.4	3.4	.4				.4	7.4
NW	.2				.2	3.9	.2				.2	7.2						
NNW	.3				.3	4.5	.1				.1	2.9						
Total percent	92.2	1.2			93.4		25.9	67.7	5.7		99.3		13.2	54.8	30.4	.9	99.3	
	Number of observations, 971; percent, 0–3; knots, 6.6						Number of observations, 967; percent, 0–3; knots, 0.7						Number of observations, 908; percent, 0–3; knots, 0.7					

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	1.2	0.3	0.2	0.2	1.9	14.4	2.4	0.8			3.2	11.3	2.8				2.8	6.4
NNE	3.5	1.1	.5	.2	5.3	15.1	3.5	.3			3.8	9.3	4.1	0.9			5.0	9.1
NE	4.8	5.4	2.6	.9	13.7	21.2	5.6	4.8	2.4	0.3	13.1	17.5	7.8	2.3	0.5		10.6	12.0
ENE	6.6	16.8	19.0	3.9	46.3	26.8	9.0	5.6	5.9	.8	21.3	19.8	5.5	8.2	.5		14.2	16.5
E	4.3	8.3	9.3	.8	22.7	25.0	9.1	6.1	1.6	.5	17.3	16.1	11.5	5.5			17.0	12.8
ESE	1.7	1.1	.4		3.2	15.5	9.8	2.4	.3		12.5	10.7	9.6	2.6			11.9	11.4
SE	.9				.9	7.2	5.0	.3			5.3	8.5	5.0	.5			5.5	8.9
SSE	1.2				1.2	6.2	4.0				4.0	7.0	3.7	.9			4.6	8.9
S	.2				.2	6.8	2.7	.3			3.0	7.4	5.5	.5			6.0	9.1
SSW	.9				.9	5.0	1.1	.3			1.4	8.5	2.3				2.3	7.8
SW	.1				.1	5.8	1.6	.5			2.1	10.9	2.3	.4			2.7	6.4
WSW	.3				.3	7.8	1.6				1.6	7.0	2.8				2.8	8.3
W	.3				.3	4.9	1.6				1.6	6.2	1.8				1.8	7.8
WNW							.5				.5	5.8	1.8				1.8	5.4
NW	.5	.2			.7	10.7	2.4	.3			2.7	7.6	5.5	.5			6.0	8.0
NNW	.9				.9	6.4	2.1				2.1	5.4	2.3				2.3	7.0
Total percent	27.4	33.2	32.0	6.0	98.6		62.0	21.7	10.2	1.6	95.5		74.3	22.0	1.0		97.3	
	Number of observations, 648; percent, 0–3; knots, 1.4						Number of observations, 375; percent, 0–3; knots, 4.5						Number of observations, 218; percent, 0–3; knots, 2.7					

Ocean Areas for Surface Meteorological Tables.

The numbers in each 5° square is the number of the table for that area.

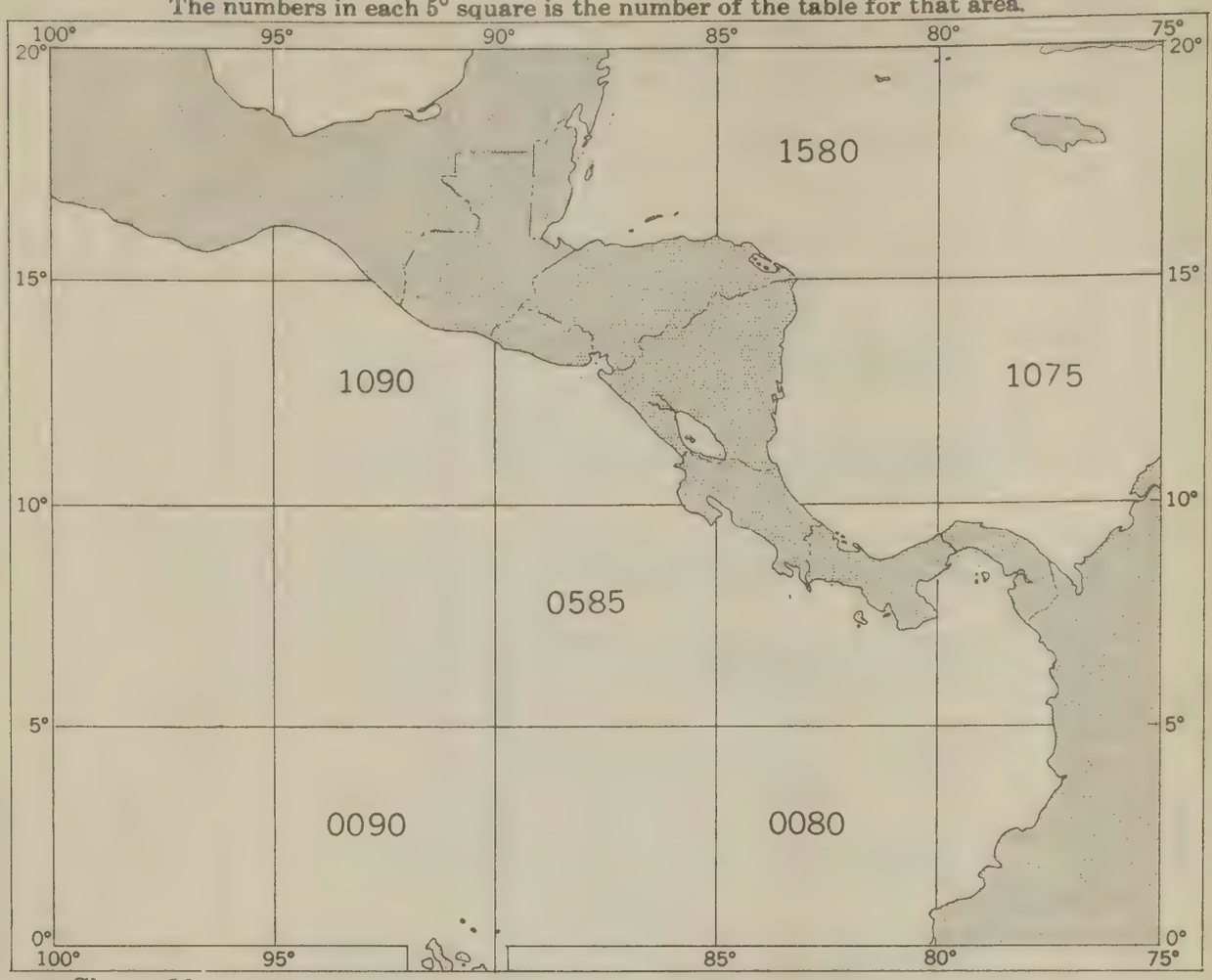


Chart 20.

METEOROLOGICAL TABLES

Ocean area: 1075. Position: Lat. 10° to 15° N., Long. 75° to 80° W. Years covered 1885 to 1933.

[Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount—(0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	
January	1,898	17	11	73	14	1	(1)	(1)	------	1	(1)	4	(1)	------	(1)	2	4	(1)	(1)	1	9	4.5
February	1,727	15	13	70	14	2	(1)	(1)	(1)	1	(1)	4	(1)	(1)	(1)	6	4	(1)	(1)	1	9	4.5
March	2,032	14	17	65	11	2	1	(1)	1	2	1	4	(1)	(1)	(1)	1	2	(1)	(1)	1	4	4.5
April	1,950	12	15	66	14	2	1	(1)	1	1	1	6	1	(1)	(1)	1	3	(1)	------	1	2	5.1
May	1,782	11	7	57	23	4	2	1	1	2	2	4	1	(1)	1	3	5	1	(1)	(1)	8	5.4
June	1,951	13	4	57	28	4	2	2	1	1	2	5	1	(1)	(1)	4	6	2	(1)	1	7	5.7
July	2,241	15	4	67	23	2	1	1	1	1	1	6	1	(1)	(1)	3	4	1	(1)	1	6	5.5
August	2,154	12	5	61	22	5	2	1	1	1	1	4	(1)	(1)	(1)	3	4	2	(1)	1	7	5.2
September	1,981	9	7	47	24	7	4	3	1	2	4	2	(1)	(1)	(1)	5	5	2	(1)	(1)	8	5.4
October	1,935	9	5	41	21	9	7	6	3	3	5	2	(1)	(1)	(1)	5	7	2	(1)	(1)	8	5.3
November	1,845	11	10	54	16	4	4	4	2	3	2	2	1	(1)	1	7	7	1	------	(1)	8	5.3
December	2,355	16	9	75	12	1	1	(1)	1	1	1	3	1	(1)	(1)	2	4	(1)	(1)	1	6	4.7
Mean	------	13	9	61	18	4	2	2	1	2	2	4	1	(1)	(1)	4	5	1	(1)	1	7	5.1
Total	23,851	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

[1] Less than 0.5 percent.

Meteorological Tables—Continued

Ocean area: 0585.

Position: Lat. 5° to 10° N., Long. 85° to 90° W.

Years covered: 1879 to 1933.

[Greenwich noon observations]

Month	Number of observations surveyed	Wind									Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—								Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force or over)	Exceptional visibility	
January	596	7	26	30	7	2	2	4	9	12	7	2	1	1	(1)	2	1	1		1	14	2.9
February	462	7	25	31	8	2	2	3	14	9	8	3			(1)	(1)	(1)	(1)			19	2.4
March	569	6	23	24	10	3	3	3	10	14	10	8	(1)			(1)	1	1			13	2.7
April	558	6	20	20	10	5	4	4	12	16	9	7	(1)		1	2	3	1	(1)		11	3.9
May	572	5	9	9	10	8	10	11	21	12	10	5	(1)		1	7	9	6	(1)		11	5.0
June	520	6	6	8	8	7	11	22	22	11	6	2			1	10	8	8			9	5.9
July	583	6	9	15	12	7	7	15	18	10	6	1	(1)	(1)	(1)	10	5	6	(1)		9	6.3
August	577	6	8	8	8	6	10	16	25	13	6	1			(1)	10	8	6			10	6.6
September	535	6	3	5	6	10	10	22	30	9	6	3	1		1	14	12	3	(1)	(1)	7	7.0
October	557	7	5	7	7	7	11	25	27	7	4	1	1		1	13	11	5			12	6.7
November	571	7	18	16	8	3	7	16	16	10	6	1			1	7	6	2	(1)		13	5.4
December	591	7	20	24	7	3	4	8	17	12	5	2	1		1	2	6	1			15	3.6
Means		6	14	16	8	5	7	12	18	11	7	3	(1)	(1)	1	6	6	3	(1)	(1)	12	4.9
Total	6,691																					

[1] Less than 0.5 percent.

Ocean area: 1090. Position: Lat. 10° to 15° N.; Long. 95° to 100° W. Years covered: 1879 to 1933.

[Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	
January	495	10	33	28	8	3	1	2	8	14	4	3	(1)	1	(1)	(1)				5	18	2.1
February	478	8	26	25	9	3	2	2	12	14	6	3	(1)	(1)	(1)	2	1	2		3	18	2.6
March	484	7	27	16	9	3	1	3	16	16	9	5	1		(1)	(1)	(1)	(1)	(1)	3	11	2.5
April	457	7	21	15	7	4	3	5	21	16	8	13	1	(1)		(1)	1	(1)		2	11	3.1
May	380	6	16	16	12	3	4	10	16	15	8	7	1		(1)	3	3	6		1	14	4.1
June	424	7	14	14	14	8	5	9	16	13	7	2			(1)	10	7	8	1	(1)	14	6.4
July	521	7	18	20	21	6	3	5	10	11	5	2	(1)		(1)	10	5	8	(1)	4	10	5.2
August	519	7	19	21	19	7	3	5	10	11	6	2		(1)		9	6	11		4	10	5.6
September	495	7	13	12	12	6	5	12	20	12	7	2			2	10	7	5	1	1	12	6.2
October	553	10	17	20	10	3	4	12	17	13	4	2	(1)	(1)	1	7	6	4		2	15	5.1
November	500	10	30	26	9	3	3	3	9	13	5	3		(1)	(1)	1	1	2		4	21	2.9
December	423	9	28	34	10	2	1	2	6	9	7	4	(1)	(1)	(1)	1	(1)	1		4	17	2.5
Mean		8	22	21	12	4	3	6	13	13	6	4	(1)	(1)	(1)	4	3	4	(1)	3	14	4.0
Total	5,729																					

[1] Less than 0.5 percent.

Meteorological Tables—Continued

Ocean area: 0090. Position: Lat. 00° to 05° N.; long. 90° to 95° W. Years covered: 1884 to 1933.

[Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0-10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	
January	87	7	3	6	6	25	33	11	6	4	5	1	------	-----	1	7	7	------	------	------	1	5.5
February	68	6	10	12	5	14	14	15	20	3	7	3	1	-----	4	6	4	1	------	------	16	5.2
March	95	5	8	5	14	14	13	10	12	13	10	6	1	-----	3	5	9	1	------	------	5	4.9
April	103	5	3	4	12	30	28	9	6	5	3	3	1	-----	------	8	3	3	------	------	16	4.7
May	64	8	2	------	8	32	37	12	2	3	3	5	------	-----	------	6	6	2	------	------	23	4.5
June	77	8	1	3	1	19	53	17	5	------	------	3	3	-----	1	5	9	------	------	------	5	8.5
July	94	10	1	------	------	19	49	27	2	------	1	2	9	-----	2	6	3	------	------	------	13	7.1
August	88	9	------	1	------	14	70	12	------	------	3	1	1	-----	5	5	10	------	------	------	3	7.2
September	86	11	------	------	2	15	55	24	2	1	------	1	1	1	6	7	15	------	------	------	6	7.1
October	109	10	1	------	1	14	53	27	3	1	------	3	1	-----	3	4	13	------	------	------	6	7.3
November	99	10	------	------	4	23	49	22	1	------	1	3	4	-----	2	4	7	------	------	------	15	6.4
December	114	8	1	------	1	24	53	12	2	------	7	3	1	-----	7	6	11	------	------	------	10	7.7
Means	------	8	2	3	5	20	42	17	5	2	4	3	2	(1)	3	6	8	1	------	------	10	6.3
Total	1,084	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

[1] Less than 0.5 percent.

Ocean area: 0080. Position, lat. 00° to 05° N., long. 80° to 85° W. Years covered: 1877 to 1933.

[Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	
January	224	7	20	8	1	8	29	17	6	5	4	4	2	-----	1	6	6	(1)	-----	(1)	12	5.3
February	164	6	28	23	5	8	19	3	3	4	8	2	1	-----	1	6	4	1	-----	-----	16	5.2
March	189	5	20	16	9	8	15	11	3	7	10	10	3	1	3	4	2	1	-----	-----	10	5.1
April	172	6	7	9	9	9	29	19	6	6	6	6	1	-----	1	4	3	1	-----	-----	12	5.4
May	174	8	2	1	1	11	30	48	4	4	1	1	1	-----	-----	8	4	3	-----	-----	18	5.5
June	191	10	-----	-----	1	2	40	46	5	3	2	2	1	1	2	8	4	1	1	-----	12	6.1
July	210	9	-----	-----	1	4	40	43	8	2	3	4	-----	(1)	1	8	7	2	-----	-----	11	6.2
August	214	9	1	(1)	(1)	4	37	53	4	(1)	-----	5	1	-----	1	6	8	1	-----	1	10	6.5
September	204	10	(1)	-----	1	2	46	43	5	1	(1)	3	2	-----	3	9	10	1	1	-----	12	6.2
October	198	10	1	-----	1	2	34	56	6	1	-----	3	1	-----	4	6	10	1	-----	-----	10	6.0
November	202	9	-----	1	1	2	49	40	7	1	1	(1)	1	-----	3	11	3	(1)	-----	-----	14	5.9
December	233	9	3	3	(1)	2	40	43	5	3	(1)	1	1	-----	3	6	5	-----	-----	-----	14	6.4
Means	-----	8	7	5	2	5	34	35	5	3	3	3	1	(1)	2	7	6	1	(1)	(1)	13	5.8
Total	2,375	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

[1] Less than 0.5 percent.

Meteorological Tables—Continued

Ocean area: 1580. Position: lat. 15° to 20° N., long. 80° to 85° W. Years covered: 1884 to 1933

[Greenwich noon observations]

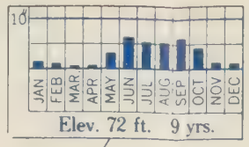
Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	
January	1,057	12	12	47	28	9	1	(1)	1	2	1	1	------	------	(1)	3	4	(1)	(1)	(1)	10	4.7
February	986	11	16	40	26	10	3	(1)	1	3	1	2	(1)	(1)	(1)	1	3	(1)	------	(1)	11	4.3
March	1,039	10	12	34	31	18	1	1	1	3	(1)	2	(1)	(1)	(1)	1	2	(1)	------	(1)	9	4.0
April	1,009	9	9	30	35	16	2	1	1	3	2	2	(1)	------	(1)	1	2	------	1	(1)	12	4.0
May	956	9	6	24	41	22	2	1	1	2	1	2	(1)	------	------	2	4	(1)	1	(1)	10	4.3
June	1,242	11	2	21	53	20	2	1	(1)	(1)	1	1	(1)	(1)	(1)	4	4	(1)	(1)	(1)	8	4.8
July	1,415	10	2	32	53	11	1	1	------	(1)	1	3	(1)	(1)	(1)	3	3	1	(1)	1	6	4.9
August	1,274	9	4	35	45	11	1	1	1	1	2	1	(1)	(1)	(1)	2	5	1	(1)	------	9	4.7
September	1,261	8	5	23	40	18	4	3	2	2	3	1	(1)	(1)	(1)	3	4	2	2	(1)	11	4.6
October	1,346	9	9	30	31	14	4	2	3	5	2	1	(1)	(1)	(1)	5	4	(1)	(1)	1	10	4.9
November	1,271	12	21	47	21	3	1	1	1	5	1	2	(1)	------	(1)	6	6	(1)	(1)	1	9	5.1
December	1,059	12	14	51	27	6	(1)	(1)	1	2	(1)	1	(1)	(1)	(1)	3	(1)	5	------	(1)	11	4.6
Means	------	10	9	35	36	13	2	1	1	2	1	2	(1)	(1)	(1)	3	3	1	(1)	(1)	10	4.6
Total	13,915	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

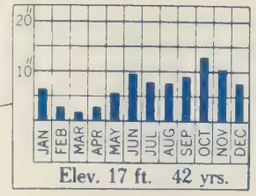
[1] Less than 0.5 percent.

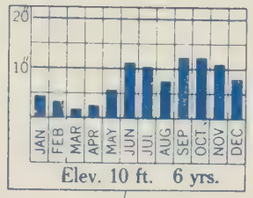
SEASONAL DISTRIBUTION OF RAINFALL

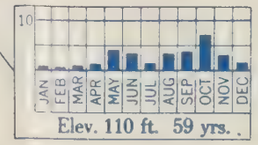
The rainfall profiles shown are based on average monthly rainfall records in inches

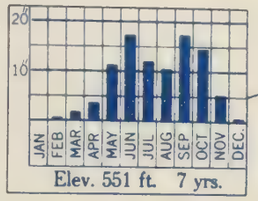


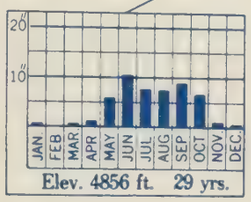


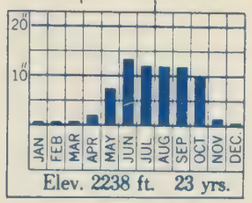


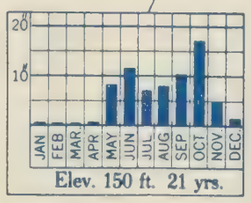


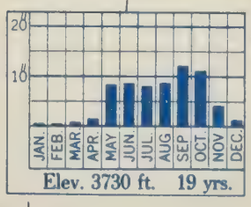


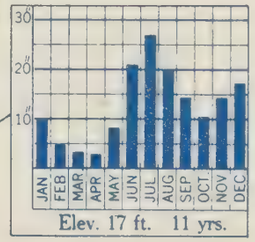


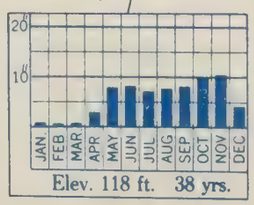


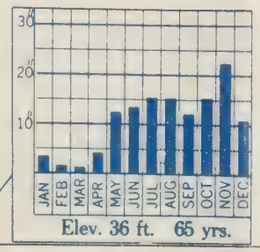


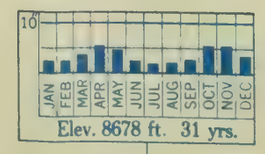


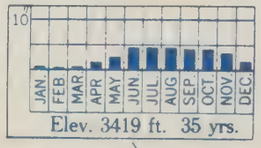












Mexico City
Merida
Belize
BR. HOND
Kingston
HISPANIOLA
CUBA
MEXICO
GUATEMALA
HONDURAS
Tapachula
Guatemala
S. Salvador
EL SALVADOR
C. Gracias a Dios
NICARAGUA
Bluefields
Rivas
COSTA RICA
S. Jose
Cristobal
PANAMA
Balboa Hts.
Caracas
VENEZUELA
Bogota
COLOMBIA
Boundary in dispute

Chart 21.

WIND FORCE AND STATE OF SEA SURFACE WITH SPECIFICATIONS AND EQUIVALENTS

Beaufort No.	Description of wind	Sea area			Land area	Nautical miles per hour	Terms used in U. S. Weather Bureau forecasts
		State of sea surface	Description of sea	Scale			
0	Calm	Sea like a mirror—smooth	Glassy-calm	0	Calm; smoke rises vertically	less than 1	Light.
1	Light air	Ripples with the appearance of scales are formed, but without foam crests.	Rippled	1	Direction of wind shown by smoke drift but not by wind vanes.	1–3	
2	Light breeze	Small wavelets, still short but more pronounced. Crests have a glassy appearance and do not break.			Wind felt on face; leaves rustle; ordinary vane moved by wind.	4–6	
3	Gentle breeze	Large wavelets; crests begin to break; foam is not white but of glassy appearance, perhaps scattered white caps.	Smooth	2	Leaves and small twigs in constant motion; wind extends light flag.	7–10	Gentle.
4	Moderate breeze	Small waves, becoming longer; fairly frequent white caps.	Slight	3	Raises dust and loose paper; small branches are moved.	11–16	Moderate.
5	Fresh breeze	Moderate waves, taking a more pronounced long form; many white caps are formed. (Chance of some spray.)	Moderate	4	Small trees in leaf begin to sway; crested wavelets form on inland waters.	17–21	Fresh.
6	Strong breeze	Large waves begin to form; white foam crests are more extensive everywhere. (Probably some spray.)	Rough	5	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.	22–27	Strong.
7	Moderate gale (high wind).	Sea piles up and white foam from breaking waves begins to be blown in streaks along the direction of the wind.	Very rough	6	Whole trees in motion; inconvenience felt in walking against the wind.	28–33	
8	Fresh gale	Moderately high waves of greater length; edges of crest begin to break into the spindrift. The foam is blown in well-marked streaks along the direction of the wind.			Breaks twigs off trees; generally impedes progress.	34–40	Gale.
9	Strong gale	High waves. Dense streaks of foam along the direction of the wind. Sea begins to "roll." Spray may affect visibility.	High	7	Slight structural damage occurs.	41–47	
10	Whole gale (heavy gale)	Very high waves with long overhanging crests. The resulting foam, in great patches, is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea takes a white appearance. The rolling of the sea becomes heavy and shock-like. Visibility affected.	Very high	8	Seldom experienced inland; trees uprooted; considerable structural damage occurs.	48–55	Whole gale.
11	Storm	Exceptionally high waves (small and medium-sized ships might be for a time lost to view behind the waves). The sea is completely covered with long white patches of foam along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility affected.	Phenomenal[1]	9	Very rarely experienced; accompanied by widespread damage.	56–65	
12	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility very seriously affected.				Above 65	Hurricane.

[1] As might exist at the center of a hurricane.

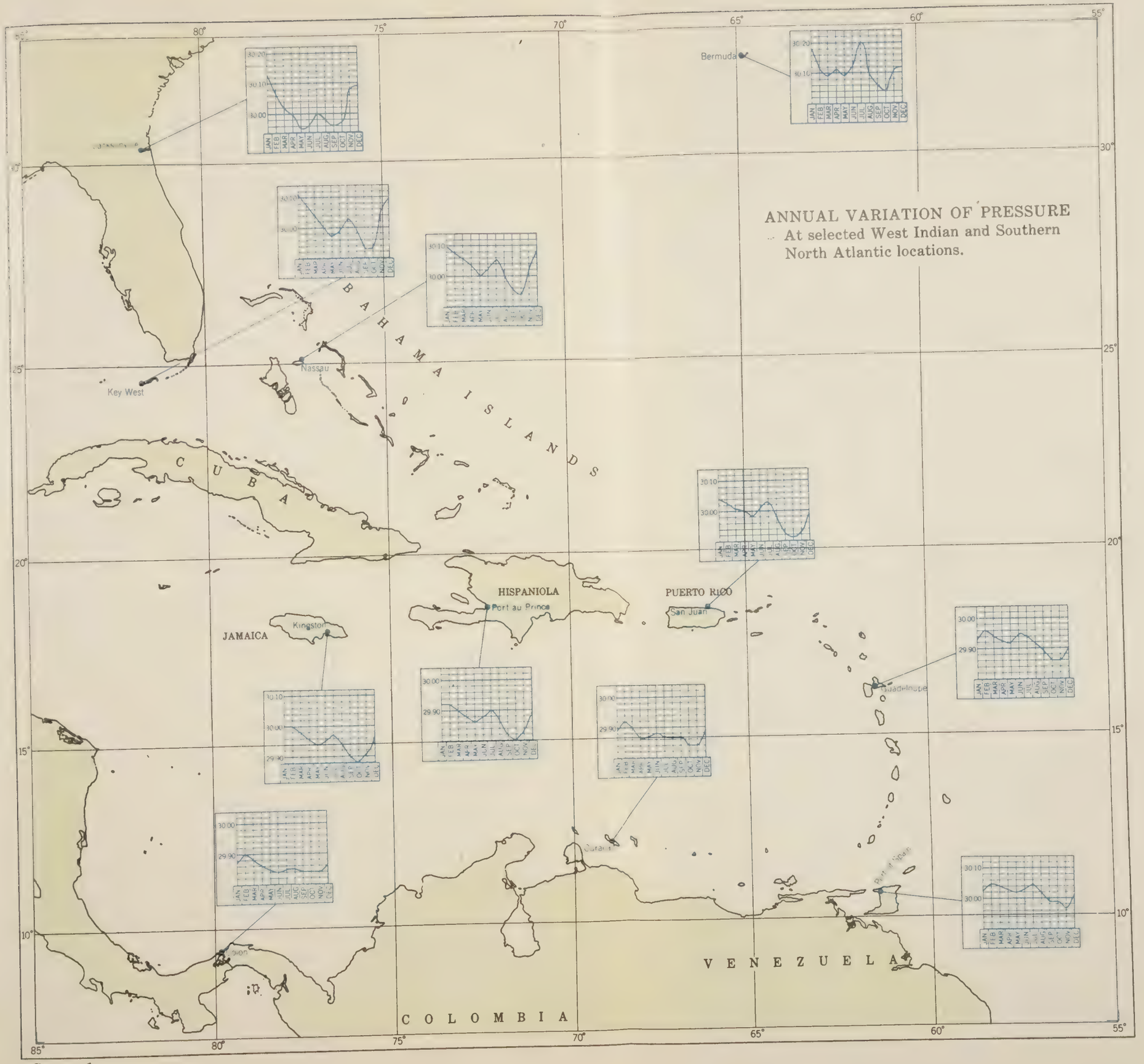

ANNUAL VARIATION OF PRESSURE
At selected West Indian and Southern North Atlantic locations.
Bermuda
Key West
Nassau
BAHAMA ISLANDS
CUBA
HISPANIOLA
Port au Prince
PUERTO RICO
San Juan
JAMAICA
Kingston
Guadeloupe
Curaçao
Port of Spain
VENEZUELA
COLOMBIA
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
85° 80° 75° 70° 65° 60° 55°
30° 25° 20° 15° 10°

CHART 1.

CHAPTER II

WINDS AND WEATHER OF THE WEST INDIAN REGION

Prepared by the United States Weather Bureau

General remarks.—This summary deals with the winds and weather of the West Indies, the north coast of South America, and waters adjacent thereto; also Bermuda and the southern tip of Florida. It refers chiefly to climates of land areas except the section in which ships' weather observations are discussed.

The dominant control of the climate of the West Indies is the northeast trade-wind system. However, from May to September, inclusive, the trades blow mostly from south of east in the West Indian region, and from north of east the remainder of the year. With some minor seasonal variations, the trades persist throughout the year and there results a marked uniformity of climatic conditions. The principal exceptions to this almost unvarying regimen are: (*a*) an occasional tropical cyclone; (*b*) intrusion of cyclonic and anticyclonic influences from the North American continent, chiefly in winter in the western and northern parts of the area.

Barometric pressure.—A subtropical belt of high pressure lies to the north and northeast of the West Indies with its center in the vicinity of the Azores. At times this belt extends westward to the Bermudas, or a separate "high" develops there, especially in winter but with much less persistence than the Azores "high." Throughout the region, at all seasons, pressure, in the average, decreases from northeast or north to southwest or south.

The distribution of pressure is shown in figure 1 and the annual variation at selected stations is shown in chart 1. There is little pressure variation in the extreme southwest as indicated by the annual curve at Colon. In the northwest especially near the North American Continent, highest pressure occurs in winter but there is a secondary rise in summer with its maximum in July. Also in the southern and eastern parts of the West Indies there are two maxima, with July pressure about as high as the winter maximum.

The July maximum is associated with an important extension of the Atlantic "high" with an attendant intensification of the trades both surface and aloft. The winter maximum is due to the effect of high pressure over North America.

The diurnal variation is marked, especially in the south and east, where there is seldom any other noticeable change of the barometer except in connection with tropical cyclones. A typical barometer trace for San Juan is given in figure 2, showing usual diurnal pressure variations and also the changes during passage of a tropical storm.

Temperature.—With the possible exceptions of the northwestern Bahamas and western Cuba, which are occasionally invaded by continental air masses, chiefly in winter, the climate of the West Indian region is distinctly tropical. The temperature is remarkably uniform, especially in the eastern and southern parts of the area.

In the Lesser Antilles, at sea level, the annual temperature is near 80°; to the west and north it is not quite so high, averaging about 77° at Nassau and Habana. This difference is largely due to the intrusion of cool air masses in winter. In the warmer months the temperatures are as high, or slightly higher in the west and north—monthly means, 82° to 83°—but the winter temperatures are lower with means of the coolest months 72° at Nassau and Habana and about 77° in the Lesser Antilles.

From this it will be seen that the annual range of temperature is small; only about 5° to 10° between the warmest and coolest months

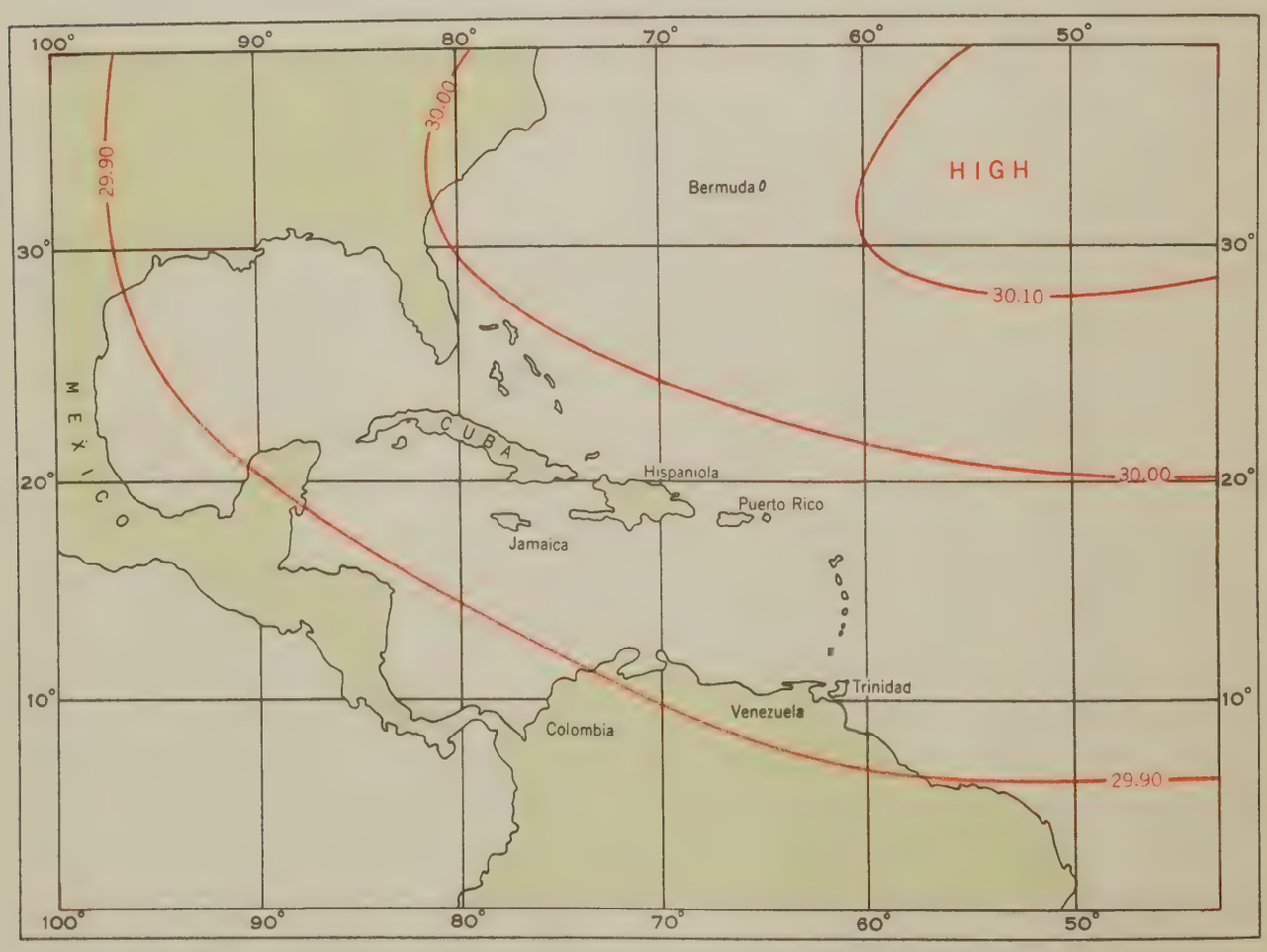


FIGURE 1.—Normal pressure over the West Indies and adjacent regions (after Fassig).


ANNUAL VARIATION OF SURFACE WATER TEMPERATURE
In selected ocean areas, 2½° squares.
BAHAMA ISLANDS
CUBA
HISPANIOLA
PUERTO RICO
JAMAICA
COLOMBIA
VENEZUELA
85°
80°
75°
70°
65°
60°
55°
25°
20°
15°
10°
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

CHART 2.

over practically all of the area and only slightly more than 10° in the extreme northwest. This stability is of course a result of the domination of the trades and the small variations of the sea surface temperatures, as shown in chart 2.

The warmest period comes in July or August in the western part of the area but in the east it comes somewhat later, usually in September in the Windward Islands. The coolest period of the year is generally in January or February. On the warmest day of the year

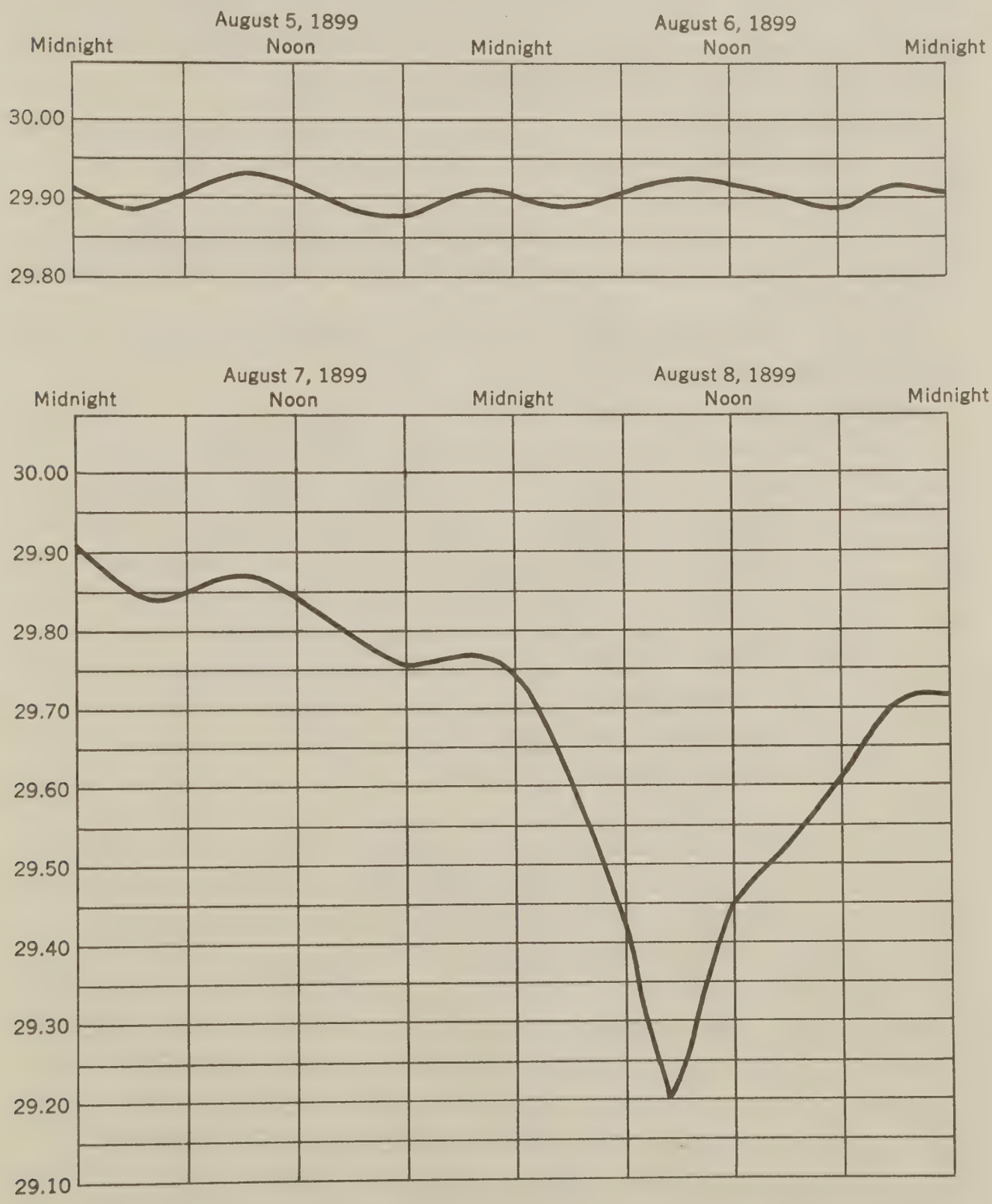


FIGURE 2.—Barograph trace at San Juan, Puerto Rico, showing diurnal variation of the barometer on August 5 and 6, 1899, and changes during passage of a tropical storm, August 7 and 8, 1899.

the temperature is usually about 90° to 95°. On the coolest day at lower elevations it is generally 60° to 68° except in the northwest where an extreme temperature a little below 60° may be expected.

At higher elevations the temperature is lower, the annual mean being about 72° at 1,500 feet and 62° at 5,000 feet. The annual range at higher elevation is about the same as at sea level.

As a factor of much importance so far as personal comfort is concerned, the high humidity in the West Indies must be mentioned. For the region as a whole the average annual percentage of relative humidity is 76 percent. In combination with the prevailing high temperatures this would be very oppressive if it were not for the dependable breezes associated with the trades.

The early spring months have lowest humidities, 72 to 73 percent, while the autumn months have the highest, averaging 78 percent for the region as a whole.

In the early morning hours the relative humidity rises to about 85 or 90 percent; at the warmest time of day it is usually between 60 and 70 percent.

In general, the humidity in leeward exposures is a little lower than on the windward sides of islands.

Rainfall.—Naturally the West Indian region is one of plentiful rainfall. The trade winds at all seasons bring ample moisture to localities that are exposed to the prevailing winds. On coasts and lowlands on the leeward sides of the islands, rainfall is as a rule considerably less than that which occurs on the windward sides, especially at higher elevations. An outstanding example is found in Dominica where the normal annual rainfall at Roseau on the west coast, elevation 25 feet, is 78 inches while the normal annual amount at Shawford, 3 miles to the northeast, with an elevation of 560 feet, is 185 inches. In Jamaica, Mooretown, at high elevation (646 feet) in the east has 222 inches annually whereas Kingston (110 feet) has only about 32 inches.

The topographical influence on the distribution of rainfall in the West Indies is so marked that it is difficult to evaluate and describe the seasonal variations. On the leeward shores of the larger islands, January is as a rule the dry month with the season of light rainfall extending from December into February or March, and in some places through April. On windward shores and on the smaller islands, especially in the Lesser Antilles, March is usually the driest month (February is also relatively dry), but with a short season of light rainfall. On some windward shores April also is relatively dry.

In most localities there are two periods of heavier rains, the first coming in May or June and the second in September, October, or November. The wettest period in autumn is usually October or November on windward slopes and September or October to the leeward.

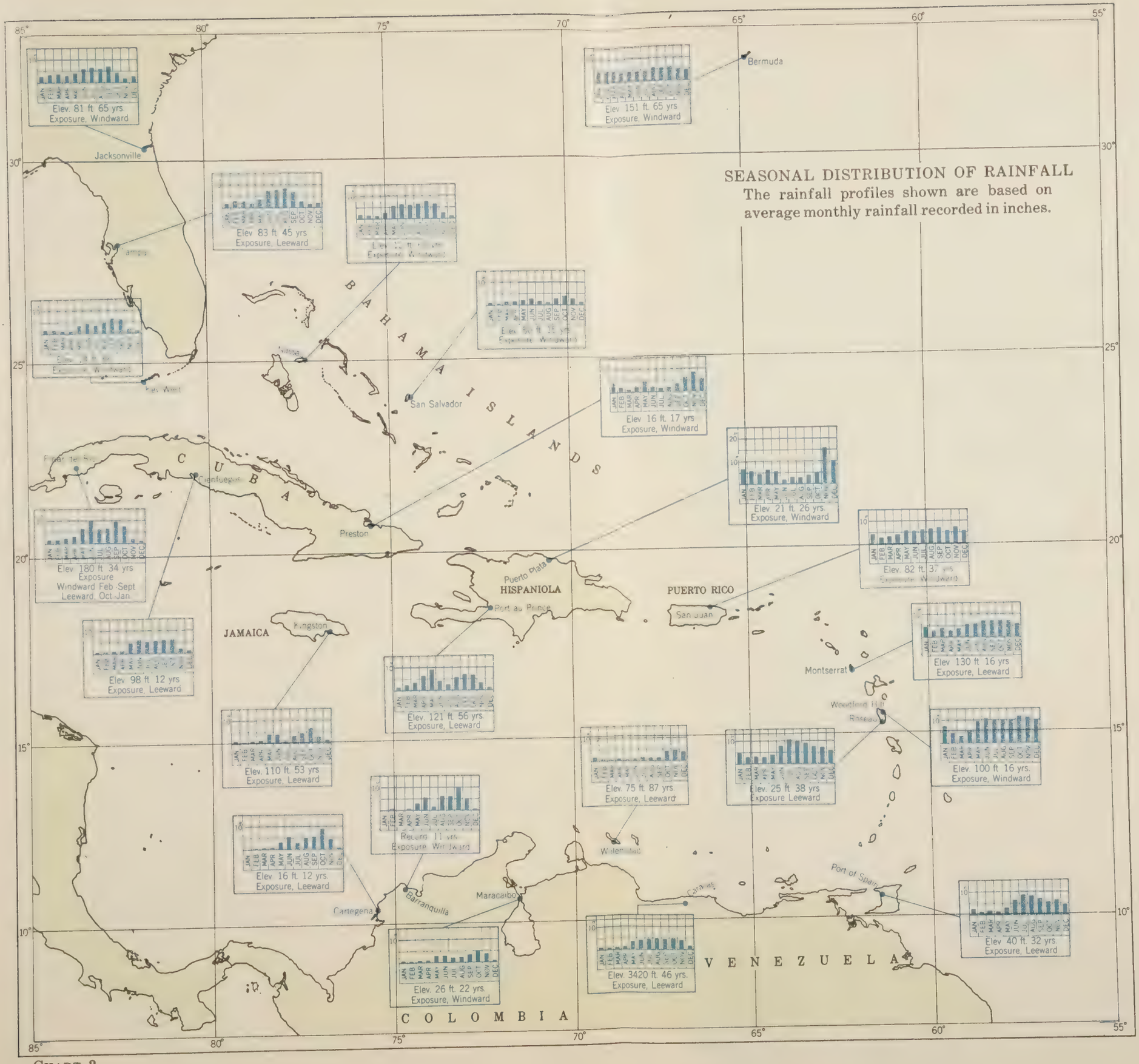

SEASONAL DISTRIBUTION OF RAINFALL
The rainfall profiles shown are based on average monthly rainfall recorded in inches.
Elev. 81 ft. 65 yrs. Exposure, Windward
Jacksonville
Elev 151 ft. 65 yrs Exposure, Windward
Bermuda
Elev 83 ft. 45 yrs Exposure, Leeward
BAHAMA ISLANDS
San Salvador
Elev 16 ft. 17 yrs Exposure, Windward
Elev. 21 ft. 26 yrs. Exposure, Windward
CUBA
Cienfuegos
Preston
Elev 180 ft. 34 yrs Exposure Windward Feb-Sept Leeward, Oct.-Jan.
Puerto Plata
HISPANIOLA
Port au Prince
PUERTO RICO
San Juan
Elev. 82 ft. 37 yrs
JAMAICA
Kingston
Elev 98 ft. 12 yrs Exposure, Leeward
Elev. 121 ft. 56 yrs. Exposure, Leeward
Montserrat
Elev 130 ft. 16 yrs Exposure, Leeward
Elev. 110 ft. 53 yrs Exposure, Leeward
Elev. 75 ft. 87 yrs. Exposure, Leeward
Elev. 25 ft. 38 yrs Exposure Leeward
Elev. 100 ft. 16 yrs. Exposure, Windward
Elev. 16 ft. 12 yrs. Exposure, Leeward
Barranquilla
Cartagena
Maracaibo
Port of Spain
Elev. 40 ft. 32 yrs. Exposure, Leeward
Elev. 3420 ft. 46 yrs. Exposure, Leeward
VENEZUELA
Elev. 26 ft. 22 yrs. Exposure, Windward
COLOMBIA
85°
80°
75°
70°
65°
60°
55°
30°
25°
20°
15°
10°

CHART 3.

In many places a secondary and shorter dry period occurs in midsummer, usually July. The midsummer dry period is most marked on the leeward sides of the larger islands. In a few places in Cuba and Haiti, July is the driest month of the year and, on the other hand, the wettest month is commonly in midsummer at some places in the Leeward Islands.

The relatively small amount of rain received in the Dutch West Indies is rather surprising in view of their exposure to moist winds. Average annual amounts there range from 17 to 26 inches. May is the driest month, averaging about one-half inch, after which rainfall increases steadily until November with an average of more than 4 inches. From December to May, steadily diminishing rainfall is the rule.

Very heavy rains occur frequently in the West Indies. Torrential rains sometimes accompany tropical storms. Perhaps the heaviest annual amounts (sometimes over 300 inches) occur at Mooretown, Jamaica. One of the most remarkable records of heavy rainfall is that made at Silver Hill and Farm Hill, Jamaica, in November 1909. From the 4th to 11th, inclusive, 135 inches fell at Silver Hill and more than 120 inches at Farm Hill. The greatest amount in one day was 38.50 inches at Farm Hill. For the seasonal distribution of rainfall at selected stations see chart 3.

Thunderstorms.—From November to April thunderstorms are uncommon on the islands. They are most frequent in late summer and early autumn. The average annual number of days with thunderstorms is 60 to 100 on the large islands and considerably less on the smaller islands, some having only 15 to 20 thunderstorm days.

Fog.—At low elevations in the southern part of the West Indian region, fog is practically unknown. In the northwestern part of the area, fog occurs chiefly during the period from January to March, inclusive, and then only occasionally.

Winds.—All of the West Indian region is under the influence of the northeast trade wind system throughout practically the entire year. Over the eastern islands, the trades blow with great constancy from points between east-northeast and east-southeast. In the Bahama group, easterly winds are prevalent but with a considerable frequency also from the northeast in winter and from the southeast in summer. Over the Greater Antilles and the western Caribbean Sea the direction of the dominant winds is between north and east all the year, with north to northeast winds most often in winter and northeast to east and, locally, southeast winds in summer.

Although the prevailing wind system of this region as a whole is simple, there are some seasonal and diurnal changes that should be considered.

The principal seasonal variation is an increase in strength of the trades in midsummer over most of the area, with lighter winds in spring

and autumn, especially at the latter season in the Caribbean Sea. There are also higher average winds in th enorthwestern parts of the area in late autumn and winter under the influence of anticyclonic conditions on the continent. The pressure changes associated with these wind variations are shown in chart 1.

Diurnal variations in both direction and force of the wind are noticeable near the coasts of all except the smaller islands. On windward coasts there is an acceleration of the prevailing wind in the late forenoon and early afternoon, while the weakest winds occur just before sunrise. On leeward coasts of the larger islands the land and sea breezes are well developed, but on the smaller islands there is a weakening of the prevailing trade wind by day on the leeward coasts and an acceleration there by night. In places where the prevailing wind blows on the coast obliquely, there is a diurnal change in direction; the wind tends to blow more squarely toward the coast by day and parallel to it by night.

In most localities in the West Indies the strongest breeze of the day comes at about 1400 and its velocity is at least two or three times that of the early morning breeze in the lull before sunrise.

The land and sea breeze phenomenon is purely local and is set up by the contrasting temperatures between sea and land. Its influence does not extend far from land. The trade wind, however, is a deep current extending over a vast area; as soon as one proceeds a relatively short distance from shore, the trade is found to be the predominant wind.

Northers.—The West Indian region proper is not often affected by true northers that accompany strong anticyclones over the United States. Even when they do extend into the West Indies their effects are appreciable only in the western and northwestern parts of the area. The strongest of these overflows of continental air are violent, especially along the northern shores of the westernmost islands.

One of the outstanding northers of record in the West Indies occurred in February 1899 in connection with a great anticyclone and cold wave over the United States. At Habana it was unusually cold; the wind rose to 31 knots, northeast. Along the coast there was much damage. A number of houses were washed away. At Santiago de Cuba, the norther was the most severe known. The temperature fell to 62° F. At San Juan and Kingston the norther was not felt appreciably. On the northern coast of Jamaica a severe norther was felt with some damage to small boats.

Active cyclones sometimes precede northers in low latitudes; they are attended by freshening winds from east to south. Preceding the norther of February 1899, in the western islands, freshening east winds were reported from the Lesser Antilles but the norther did not reach there.

When a tropical cyclone approaches a place from the east increasing winds from a northerly direction are felt and these winds are sometimes confused with the true norther. The northerly winds of the tropical cyclone are not relative cold or cool air masses from higher latitudes unless, as occasionally happens, the tropical cyclone late in the season turns to the northeastward and is followed by an anticyclone which penetrates to low latitudes.

In the Florida Straits, the Bahamas, and sometimes southward to Jamaica, the arrival of the norther may be foreshadowed by a heavy cloud bank on the northern or northwestern horizon and sometimes by falling barometer. Upon the arrival of the squall line the barometer rises rapidly and the wind bursts suddenly from a northerly or westerly direction with a force of 7 to 9, after which it may blow steadily for a day or two. The precursory signs of the norther are not infallible, hence the daily forecasts and occasional warnings broadcast by radio should be secured.

Extratropical disturbances of the cooler half of the year seldom follow each other in rapid succession in low latitudes. Slight winds and fine weather usually follow a disturbance. The approach of succeeding "lows" from the northward may be indicated by falling barometer and increasing wind force. Midwinter gales generally commence from the southward, veer around by west, and terminate at northwest or north-northwest. When the disturbance originates near the Bahamas and moves northward the winds along the Gulf Stream may increase while backing from easterly through north to northwest or west.

Some of the barometric depressions of winter are elongated, generally in a northeast to southwest direction, sometimes with a squall line or cold front where there is a sudden change of wind to a northwest gale. Violent winds are occasionally experienced at the cold front.

These effects of the extratropical disturbance are rarely felt except near Florida and western Cuba and thence northeastward to Bermuda.

While the disturbances of higher latitudes occasionally affect the northwestern part of the West Indian region in winter and less frequently in spring and autumn, the weather conditions as a rule are favorable for air navigation; April and May are usually the most favorable months. The hurricane season is likely to begin in June, especially in the western Caribbean Sea. Thereafter, until November, the hazards of tropical storms exist and, though the chance of encountering one at any definite time and place is small, they are nevertheless very dangerous storms and every precaution should be taken to avoid them.

West Indies hurricanes.—No part of the West Indian region is entirely free from the danger of tropical storms or hurricanes. They are more frequent in some sections than others, and there are important seasonal changes in frequency and intensity. The average num-

ber of tropical storms of sufficient force to be noteworthy is about 7 a year in this region.

Records of West Indian hurricanes have been compiled for the entire period from the time of Columbus to date. The records are fragmentary for the early centuries, fairly good for the destructive hurricanes of the 19th century, and nearly complete to date in the present century. From these extensive records it is possible to arrive at a very satisfactory estimate of the probability of hurricane visitation in any locality in the long run. However, their occurrences are not periodic, hence it is not possible to make a satisfactory prediction of the storms that will occur in the individual season.

Nature of the hurricane.—The word "hurricane" is said to be of Carib Indian origin, signifying "big wind." Storms of this class are identical with the typhoons, cyclones, and baguios of other tropical waters. Not all storms of this class are destructive in energy. It is

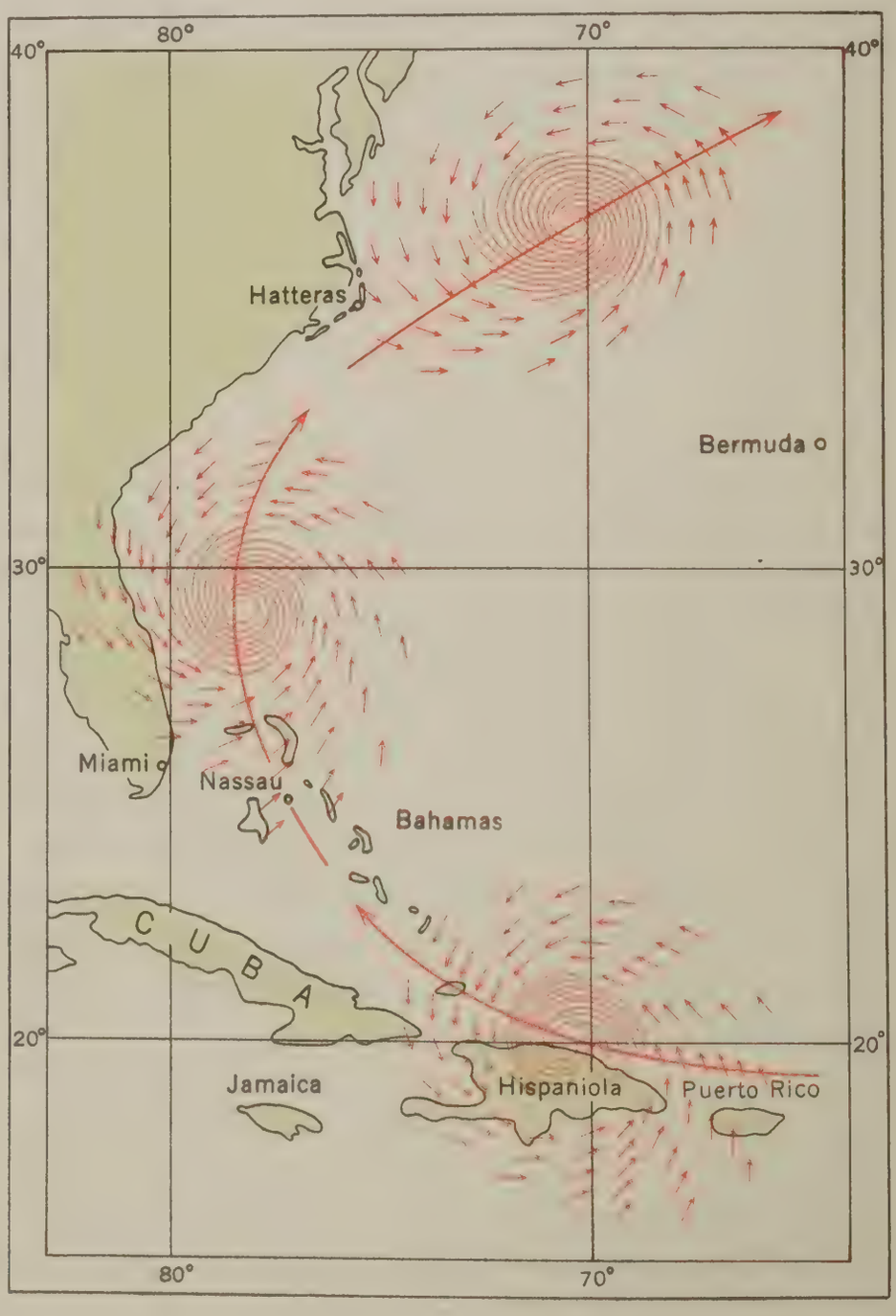


FIGURE 3.—Track and wind system of a West Indian hurricane.

customary to refer to them as tropical disturbances when in mild or doubtful stages and as tropical storms or hurricanes when fully developed.

The wind system is circular or nearly so. In the Northern Hemisphere the winds at the surface blow counter-clockwise around the center and incline inward. The diameter of the area covered by the entire wind circulation may be anywhere within a range from 25 to 50 miles up to 400 or 500 miles or even larger. At the outer limits of the hurricane the winds are moderate but characteristically gusty. The force of the wind increases in intermittent squalls as the center approaches. The highest winds are near the center. At the center there is usually a region of calm or relative calm, the diameter of which may be 5 to 25 miles; it averages about 14 miles. In this central area the sky is sometimes clear so that the sun is visible by day and the stars by night.

Progressive movements.—The hurricane has also a progressive movement which is small compared with the speed of the winds that are directed about its center. The latter sometimes reach speeds of 100 to 135 knots by actual measurement. However, the wind-measuring instruments are wrecked or rendered inoperative in the majority of instances when such high winds occur, hence the full force of the wind is not definitely known. In any event, the speed of the wind in brief gusts, which are the strongest of the hurricane, are never accurately measured. Estimates of wind speeds approaching 200 knots have been made by experienced observers.

Contrasted with these high wind movements about the central area of the hurricane, is its relatively slow progressive movement in the tropics, averaging about 12 miles an hour. Many hurricanes have moved at slower rates, some remaining stationary, or nearly so, for a day or more. In higher latitudes, many hurricanes move with much greater rapidity than in the tropics.

In low latitudes the movement is nearly always in a westerly direction, usually west-northwest or northwest. Upon reaching the parallels of 25° to 30° north latitude, many of them recurve and move more rapidly in a direction between north and east. The slowest movement is quite frequently at the point of recurve.

As the hurricane passes over, the effect of the progressive movement is to increase the force of the winds which are directed forward in the line of advance and to diminish the force of winds that are oppositely directed. If the observer faces the storm center and it approaches and passes over, the winds to his left will be stronger than the winds to his right, the difference depending upon the rate of the storm's progressive movement in relation to its circulatory rate.

As the calm or relatively calm center passes over, the winds usually abate quickly but begin again with great force from nearly the opposite direction as the other side of the central region reaches the

observer. The shifts of wind will depend upon the exact direction of storm movement relative to the observer, also his position relative to the exact center, that is, whether he passes through the edge or near the middle of the central region.

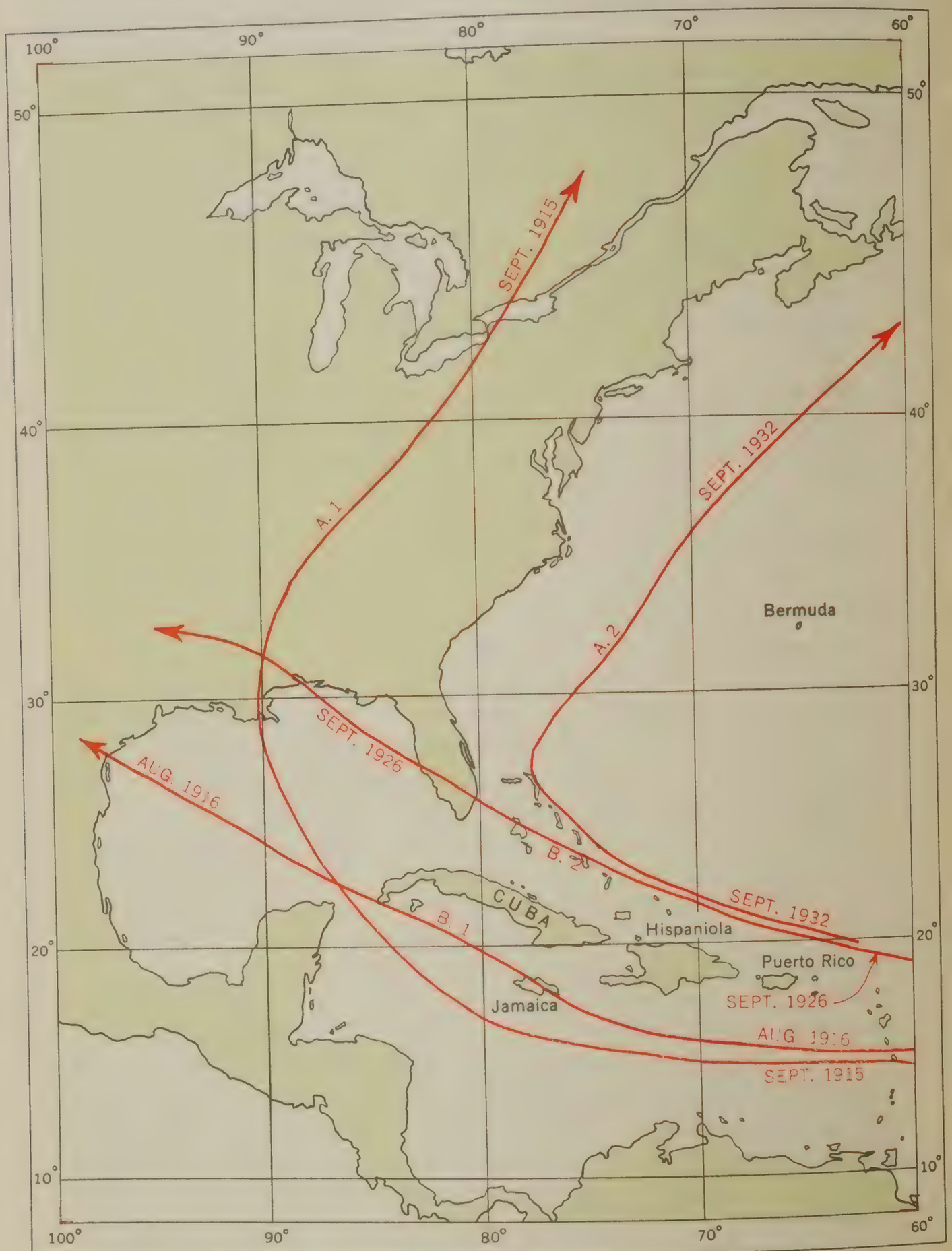


FIGURE 4.—Typical hurricane tracks with and without recurve.

The most common path is that which has been termed "parabolic" as illustrated by tracks A.1 and A.2 in figure 4. A considerable percentage of hurricanes remain in low latitudes and do not recurve as shown by tracks B.1 and B.2 in figure 4.

There have been some very irregular movements of hurricanes; a few have described loops, others have followed what might be termed a "hairpin" path. An example of the latter is the hurricane of October 19 to 26, 1935; it moved northeastward from the Caribbean Sea, reached the coast of eastern Cuba and then turned southwestward across the Caribbean Sea again and went inland over Honduras. Not infrequently a hurricane near or south of 25° north latitude, moves to the south of west. Progressive movement toward the southeast is rare in the West Indian region and when it does occur, is of very short duration.

There is a fairly well marked seasonal variation in hurricane movement. The June storms of the western Caribbean Sea usually move in a direction between west and north while south of 25° north latitude. In late September, October, and November, the storms of this region are more likely to move in a direction between north and east, passing through the Yucatan Channel, or over Cuba, Florida or the Bahamas. Of the hurricanes that come from the Atlantic into the West Indies, the majority continue to move on a northwest or west-northwest course in low latitudes except that late in the season (October or November) the movement of hurricanes that originate east of the West Indies is often toward the north in the Atlantic.

As an illustration of seasonal differences, the tracks of tropical disturbances of June and July, 1924 to 1937, and of October and November of the same years are shown in figures 5 and 6, respectfully.

Tides.—Along the coast toward which the hurricane is advancing the tide begins to rise while the storm center is a long distance away. It continues to rise as the storm advances, slowly at first, then more rapidly. If the observer stands on the shore facing the storm center the highest tides will be created on his left and will be highest at and somewhat to the left of the point where the center crosses the coast. At his right the tide will not be so high, and as the center moves inland the water, driven by off-shore winds, may be very low.

In figure 3 the winds are depicted as they are directed, momentarily, about the center of a progressing cyclone. As experienced at the earth's surface over which the cyclone passes, the winds are the resultants of progressive and cyclonic movements.

The inundations attending hurricanes and other tropical storms have in some instances caused great loss of life and destruction to property. In fact, greater loss of life and property damage have been directly attributable to water than to the force of the winds. Debris from structures wrecked by the waves and carried by the hurricane winds and the advancing water batter other buildings to

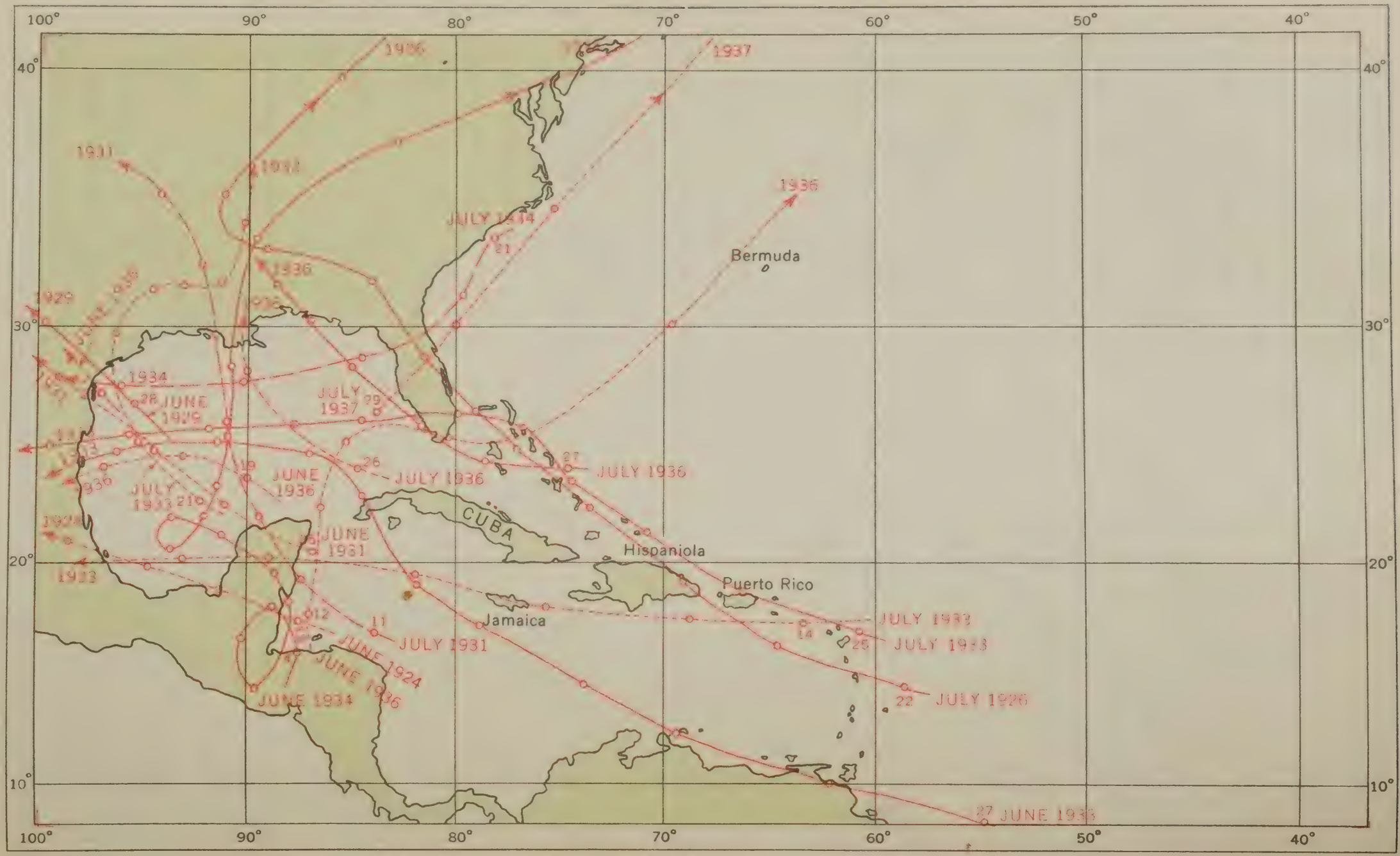
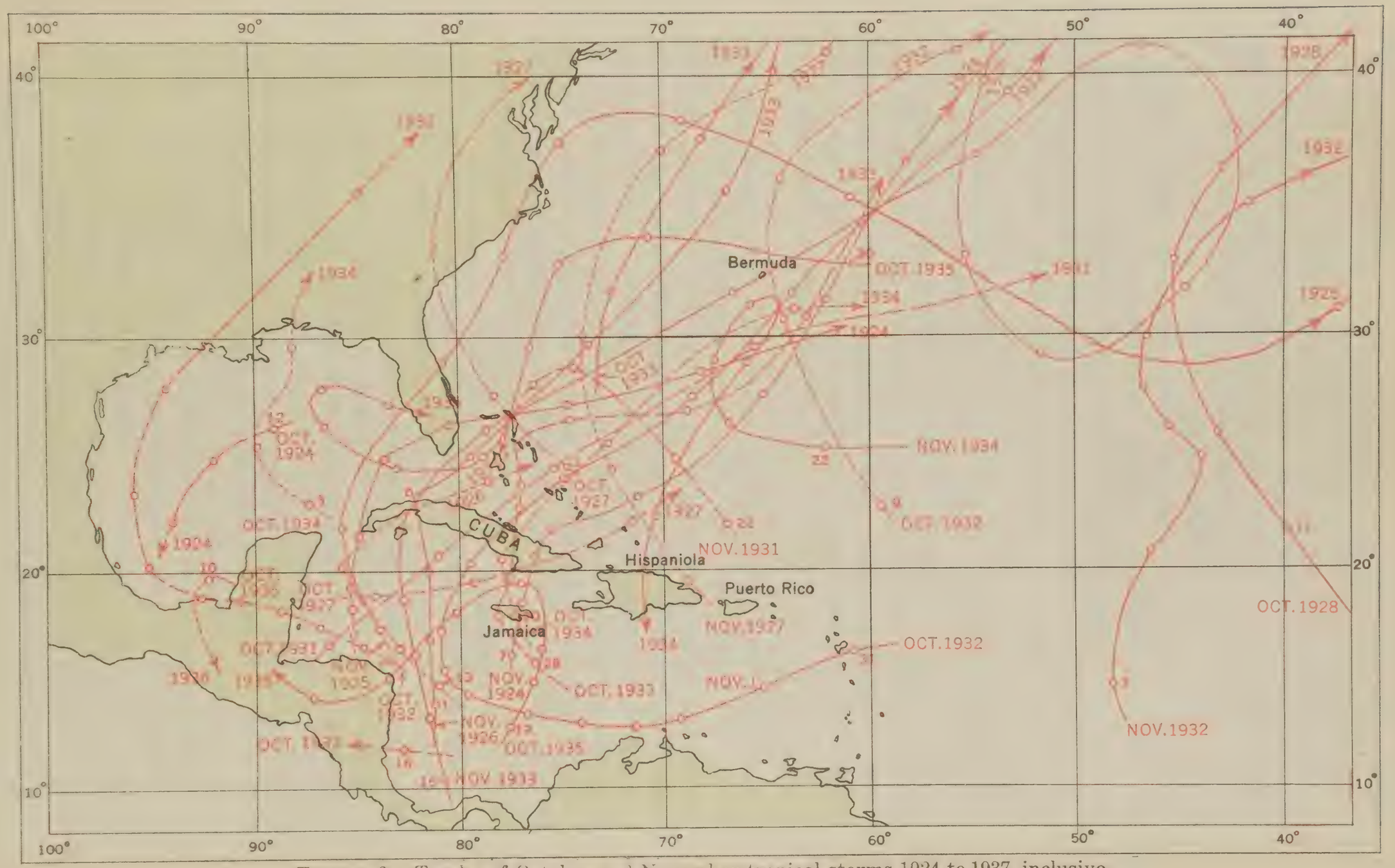


FIGURE 5. Tracks of June and July tropical storms 1924 to 1937, inclusive.


100°
90°
80°
70°
60°
50°
40°
40°
30°
20°
10°
Bermuda
CUBA
Hispaniola
Puerto Rico
Jamaica
OCT. 1935
NOV. 1934
OCT. 1932
NOV. 1931
OCT. 1928
NOV. 1932
NOV. 1933
OCT. 1935
NOV. 1926
NOV. 1924
OCT. 1933
NOV. 1927
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1927

pieces. Few structures can withstand such an onslaught, especially when the water undermines the foundations.

Other things being equal, a storm of large diameter creates higher tides on the coast than one of small diameter, and a slow-moving storm higher tides than one of rapid progress. In each case the higher water is due to the greater duration of the drive of the wind on the water in the same direction.

One of the most disastrous of hurricanes in the present century was that of November 9, 1932, at Santa Cruz del Sur, Cuba. The hurricane recurved in the Caribbean Sea and its center passed to the west of Santa Cruz del Sur, moving almost at right angles to the southern coast of Cuba, a condition most favorable for a high storm tide.

Premonitory signs.—In the Tropics the weather is normally somewhat the same from day to day. The extratropical cyclones and the anticyclones, which cause frequent changes in weather conditions in higher latitudes, seldom extend their influence into the tropical and subtropical regions to any marked degree. For that reason the approach of the hurricane is sometimes suspected when it is a long distance away because of relatively slight changes from the prevailing conditions for the season.

One of the first definite signs is the sea swell. It appears at sea as a long, unbroken wave, with the time interval between the crests considerably longer than it is in waves ordinarily observed. As the storm approaches, the seas become heavier and rougher and the tide rises above its normal height. In places where the sea cannot be observed, one of the first indications is the appearance of cirrus, or high feathery clouds, which often seem to converge at a point on the horizon. By some observers the point of convergence of high clouds on the horizon is considered a reliable indication of the direction in which the storm center lies.

At sunset and sunrise the clouds on the outer border of the hurricane are highly colored; hence a brilliant red sky is one of the well-known signs of an approaching hurricane.

Barometric pressure in the hurricane.—Normally, in tropical and subtropical regions frequented by West Indian hurricanes, the barometer reads about 30 inches at sea level. As the hurricane approaches, the barometer falls, slowly at first and then more rapidly as the center draws near. The rate of fall depends upon the depth of the barometric depression in the storm and the rate at which it approaches. In fully developed hurricanes the barometer nearly always falls below 29 inches (sea level), and there are many records of readings below 28 inches. There are a few records of barometric pressure at the center of tropical cyclones of about 27 inches, and one instance, the lowest of record, on board a ship in a typhoon, as low as 26.19 inches.

Rainfall in hurricanes.—At the outer limits of the storm, rainfall is in the form of showers. As the center approaches, the characteristic squalls of the hurricane begin, that is, the showers increase in frequency and intensity. Nearer the center the rain is heavy to excessive and continuous. Frequently the total amount of rainfall which occurs in any one place during the passage of a hurricane is quite large. Amounts exceeding 30 inches are not uncommon.

Frequency and intensity.—There are two principal places of origin of West Indian hurricanes—the western Caribbean Sea and the Atlantic Ocean just south of the Cape Verde Islands. Not all storms have been definitely traced to a point of genesis but observations indicate that they occasionally develop also in other parts of the West Indian region and the southern North Atlantic Ocean.

Hurricanes of the western Caribbean in a few instances have developed in May, but without reaching full hurricane force. In June they are somewhat more common, usually moving toward the west, northwest, or north. They rarely form in the western Caribbean Sea in July or August but by the end of September they are occasionally found there. October is the month of greatest frequency of this type; some form there in November.

The hurricanes that come from the Atlantic do not usually occur before July. They become more frequent in September and are less common in October and November.

Hurricanes of June are as a rule of only moderate intensity and some of them are only minor disturbances. A relatively few have developed into major storms. On an average the July hurricanes are somewhat more intense. The percentage of hurricanes reaching major intensity is greatest in August and somewhat less in September. During the first part of October there is a secondary maximum in the relative frequency of intense storms, after which there is a rapid decline. This secondary maximum may be explained by the increased activity in the western Caribbean Sea at that time, whereas the Atlantic hurricanes are then losing force.

At any time during the hurricane season there may be minor disturbances having cyclonic characteristics which do not develop more than mild wind systems with unsettled weather. However, all should be kept carefully under observation for the first indications of falling barometer, rising wind, or increasing sea swells. This is especially true of the period from August to the middle of October, when disturbances sometimes grow in intensity with marked rapidity.

TABLE 1.—*Tropical storms of the North Atlantic Ocean (including the Gulf of Mexico and Caribbean Sea) during the period from 1887–1938*

	1887–1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	Total
May	1	0	0	0	0	0	0	1	1	1	0	0	0	0	4
June	17	0	0	0	1	0	1	0	1	1	0	3	0	0	24
July	17	1	0	0	0	0	1	0	3	1	0	2	1	0	26
August	44	2	1	2	0	1	1	3	7	2	2	6	2	3	76
September	80	5	3	3	1	1	3	3	5	2	1	5	6	1	119
October	73	1	2	1	0	0	1	3	4	3	2	1	0	3	94
November	18	1	1	0	0	0	1	1	0	1	0	0	0	1	24
December	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	252	10	7	6	2	2	8	11	21	11	5	17	9	8	369

In figure 7, the tracks of 15 historic storms of the West Indian region (including Bermuda and the Florida Keys) are shown. These hurricanes with tracks indicated by numbers in the figure, are as follows:

1. The "Great Hurricane," October 10–18, 1780. Several of the Lesser Antilles were devastated. Many ships were sunk and more than 20,000 lives were reported lost at sea and ashore.

2. A very destructive storm at Barbados, August 10, 1831. More than 1,500 lives were lost and property damage was placed at more than $7,000,000.

3. A severe hurricane at Bermuda, September 11–12, 1839.

4. Hurricane of large diameter with center at Nassau, 2000, October 1, 1866, barometer 27.70 inches.

5. A severe hurricane on the northern coast of Cuba, September 4–5, 1888.

6. One of the greatest hurricanes of record in Puerto Rico, August 8, 1899. More than 3,000 lives were lost.

7. A hurricane of great violence in Jamaica, November 18, 1912. The storm moved slowly and the consequent continuance of violent winds resulted in nearly 20,000 houses being destroyed or badly damaged.

8. A severe hurricane in the Isla de Pinos and western Cuba on October 19–20, 1926, and at Bermuda on October 22, 1926.

9. Hurricane of extraordinary force in Puerto Rico, September 13, 1928, and in Florida, September 16, 1928. Loss of life in Puerto Rico was estimated at 300; in Florida 1,870; property damage in Puerto Rico $50,000,000; in Florida $25,000,000.

10. Hurricane of small diameter and great destructive force at Ciudad Trujillo, Dominican Republic, September 3, 1930. Loss of life was placed at 2,000, injured persons at 8,000, and property damage at $50,000,000.

11. Small but intense hurricane attended by tidal wave devastated Belize, September 10, 1931, causing death of about 1,500 persons and property damage estimated at $7,500,000.

12. Violent hurricane in the Bahamas on September 4–5, 1932. This storm was of extraordinary violence at Green Turtle Cay.

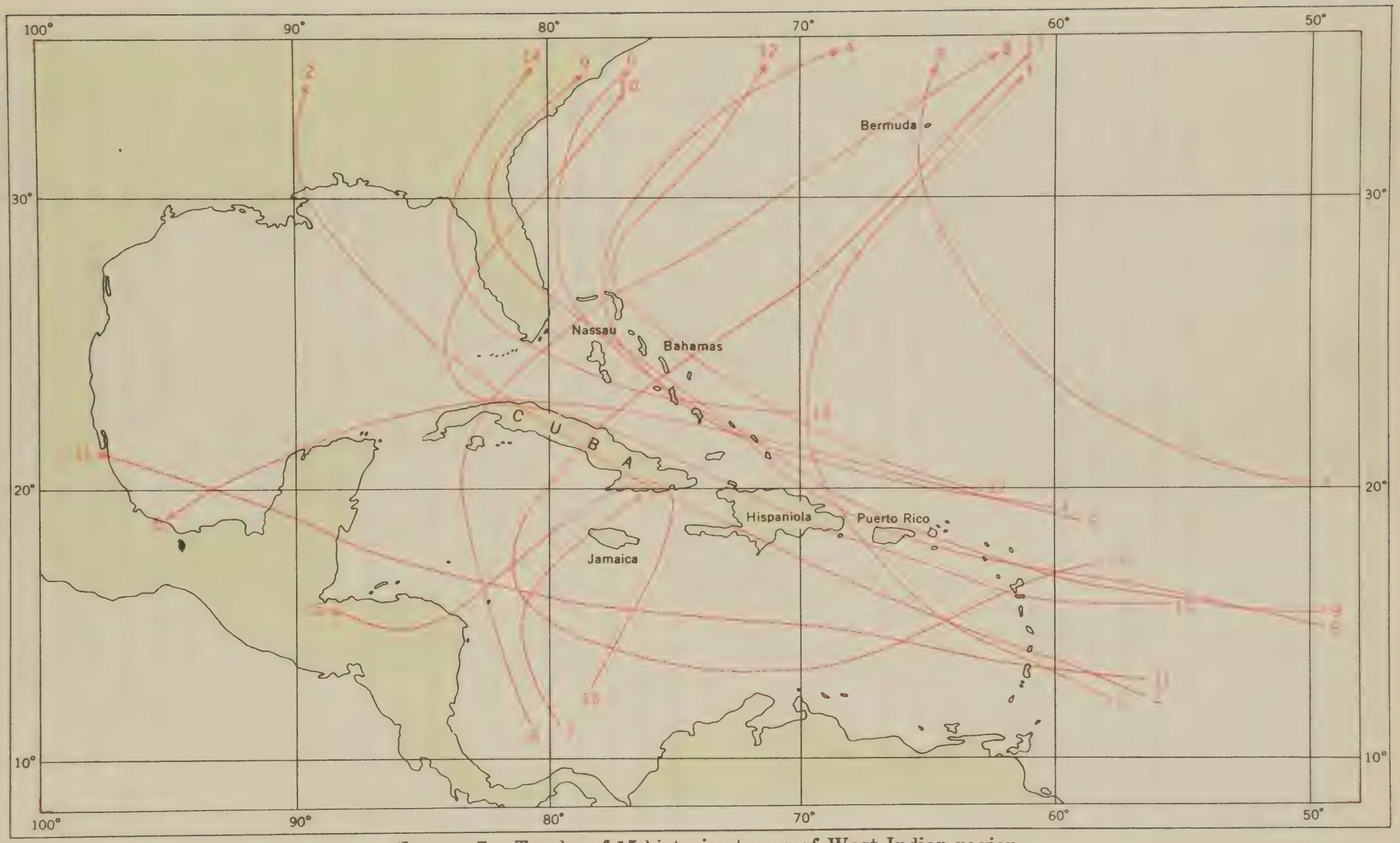


FIGURE 7. Tracks of 15 historic storms of West Indian region.

13. One of Cuba's major catastrophes resulted from this hurricane as it crossed the southern coast of the island on November 9, 1932. Santa Cruz del Sur was inundated and about 2,500 lives were lost.

14. Small hurricane, but one of the most intense of record, crossed Florida Keys at Matecumbe on September 2, 1935. Lowest pressure on the Keys was 26.35 inches.

15. "Hairpin" hurricane of October 19–26, 1935. Torrential rains attending this storm in extreme southern Haiti caused loss of life estimated from 1,000 to 2,000. Its unusual track included a "hairpin turn."

In this list no attempt has been made to include all the exceptionally violent hurricanes of the West Indian region. There are many others, a number of which were more violent than some in this list. In the historical accounts, the violence of a hurricane is judged to a large extent by property damage and loss of life. It is likely that many hurricanes of great destructive force have moved inland in sparsely settled coastal regions or have been encountered by few ships at sea and hence they have received little mention.

Through United States naval radio stations, the Weather Bureau broadcasts frequent advisory and warning bulletins when a tropical storm is in progress. The broadcast schedules are contained in H. O. Publication 205, Radio Aids to Navigation. From information received by radio, the course of the storm may be followed from day to day and necessary precautions taken. Nevertheless, the precursory signs of hurricanes, as previously described herein, should be carefully observed.

Winds and weather of ocean squares in and adjacent to the West Indian region.—In preparing charts 5 to 26, inclusive, of wind and weather, 541,227 observations taken on shipboard during the period from 1880 to 1933 were compiled and summarized. The area covered by the compilation and the total number of ships' weather observations summarized for each 5° square are shown in chart 4.

In considering these observations it must be kept in mind that practically all were taken at noon Greenwich time, which is early morning in the West Indian region. Over the open sea, the diurnal variation in wind and weather is of much less importance than it is over and in the immediate neighborhood of the larger islands. Near the coasts of larger islands there is a tendency toward strengthening of the prevailing winds during the day in windward exposures with diminishing winds or even an occasional reversal at night. The opposite is true in lee exposures.

The annual variation in wind and weather is very satisfactorily portrayed in charts for five months, February, May, July, October, and December. The entire region is so markedly under the domination of the northeast trade wind system that wind and weather conditions are quite stable in comparison with areas to the northward. The five months named were chosen as representative for the following reasons:

February shows conditions at about the coolest time of year over the ocean squares in this region, with the belt of calms on the Pacific side at its farthest southward position. The continental anticyclone is then well developed and the winds of the northern portion of the area are fairly strong. The trades over the Caribbean are well developed, at that time averaging about 11 to 12 knots. Owing to the influence of pressure changes in higher latitudes, the prevailing winds are less dependable in the northern portion than in the Caribbean.

By May, the winds over the northern portion have diminished in average force but blow with greater constancy from the east and east-southeast. Wind conditions in the Caribbean are almost unchanged except for a tendency to blow more from the eastward and east-southeastward.

In July the Atlantic anticyclone increases in strength with a consequent acceleration of the winds in the Caribbean and a greater frequency from the east-northeast. Between 20° and 25° north latitude, there is a further improvement in dependability.

October has light winds in the Caribbean mostly east and east-northeast and with less constancy than in other months. Over the northern and northwestern portions of the area, the winds have turned to the east-northeast and increased in force owing to the relatively cool continental temperatures in comparison with ocean temperatures.

By December the winter distribution of winds has become established with relatively high velocities in all the squares, attending the development of the continental anticyclone. East-northeast winds predominate in all squares.

The conditions described are shown graphically in charts 5 to 9, inclusive.

The distribution of wind forces is shown in percentages by figures entered in the 5° squares of charts 10 to 14, inclusive, for February, May, July, October, and December. Outstanding features of these charts are the high frequency of Beaufort forces 4 to 6 and the rarity of forces 7 and higher.

As an indication of wind drift aloft the observations of middle cloud direction are shown in charts 15 and 16.

The geographical distribution of factors affecting visibility is shown on charts 17 to 21, inclusive, for the five representative months. The distribution of rain, drizzle, thunderstorms, and squalls is shown on charts 22 to 26, inclusive.

The symbol "V" has been widely used by mariners to record "exceptional visibility" without any definite standards of observation. Fog is rare and squalls seldom occur except in connection with a tropical storm. Thunderstorms are most frequent over and especially on the lee sides of the larger islands in the afternoon during the warmer months.

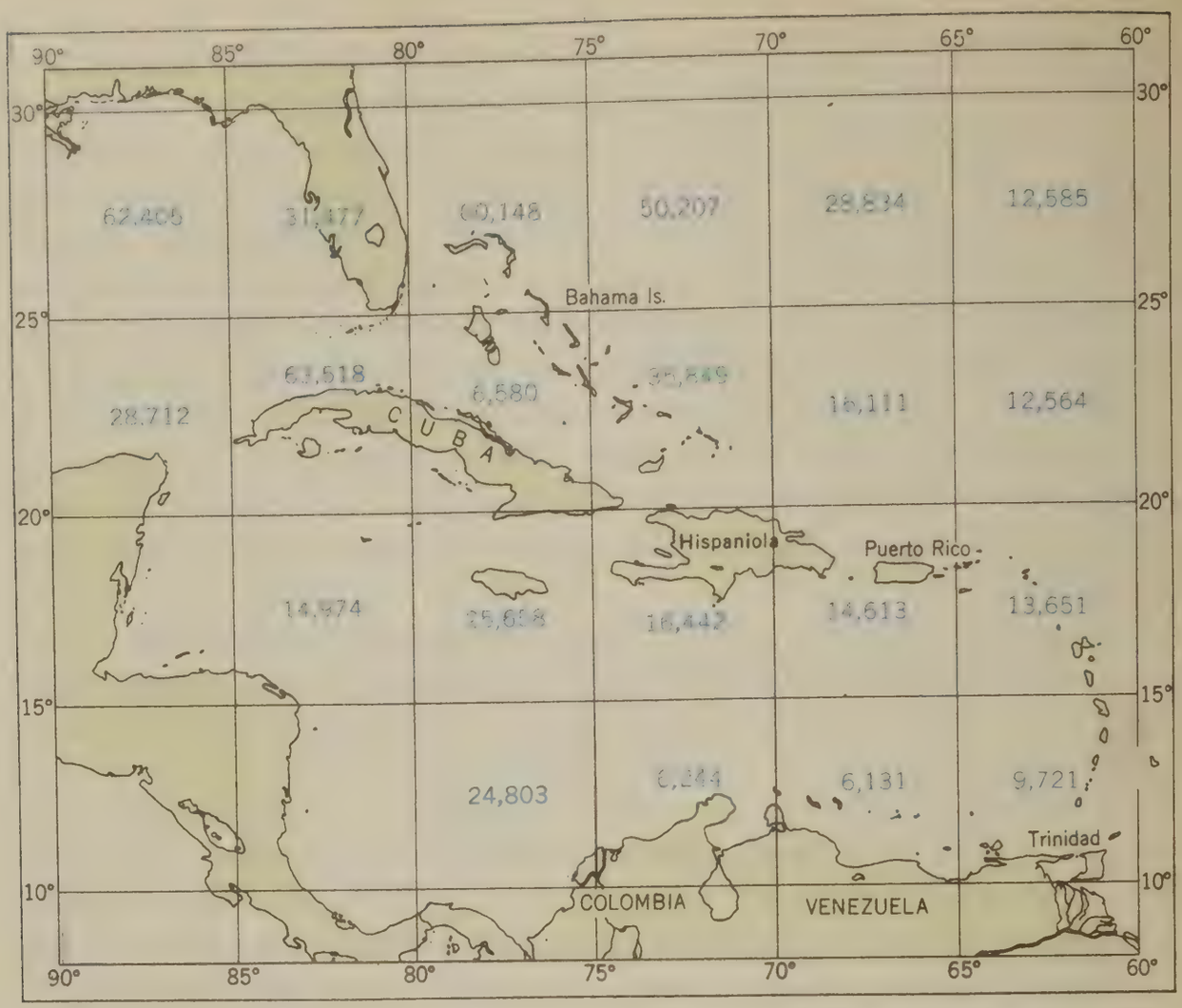


CHART 4.—The number of ships' weather observations surveyed (1880 to 1933) to obtain data shown on charts 5 to 26 is indicated by the figures entered at the center of each square. The total number for all squares in the area is 541,227.

SYMBOLS SHOWN ON CHARTS 5 TO 9

Prevailing winds move with the arrows

Direction and frequency:

- 70 percent or more
- 60 to 69 percent
- 50 to 59 percent
- 40 to 49 percent
- Less than 40 percent

Average velocity:

- Over 12 knots
- 10 to 12 knots
- # Less than 10 knots

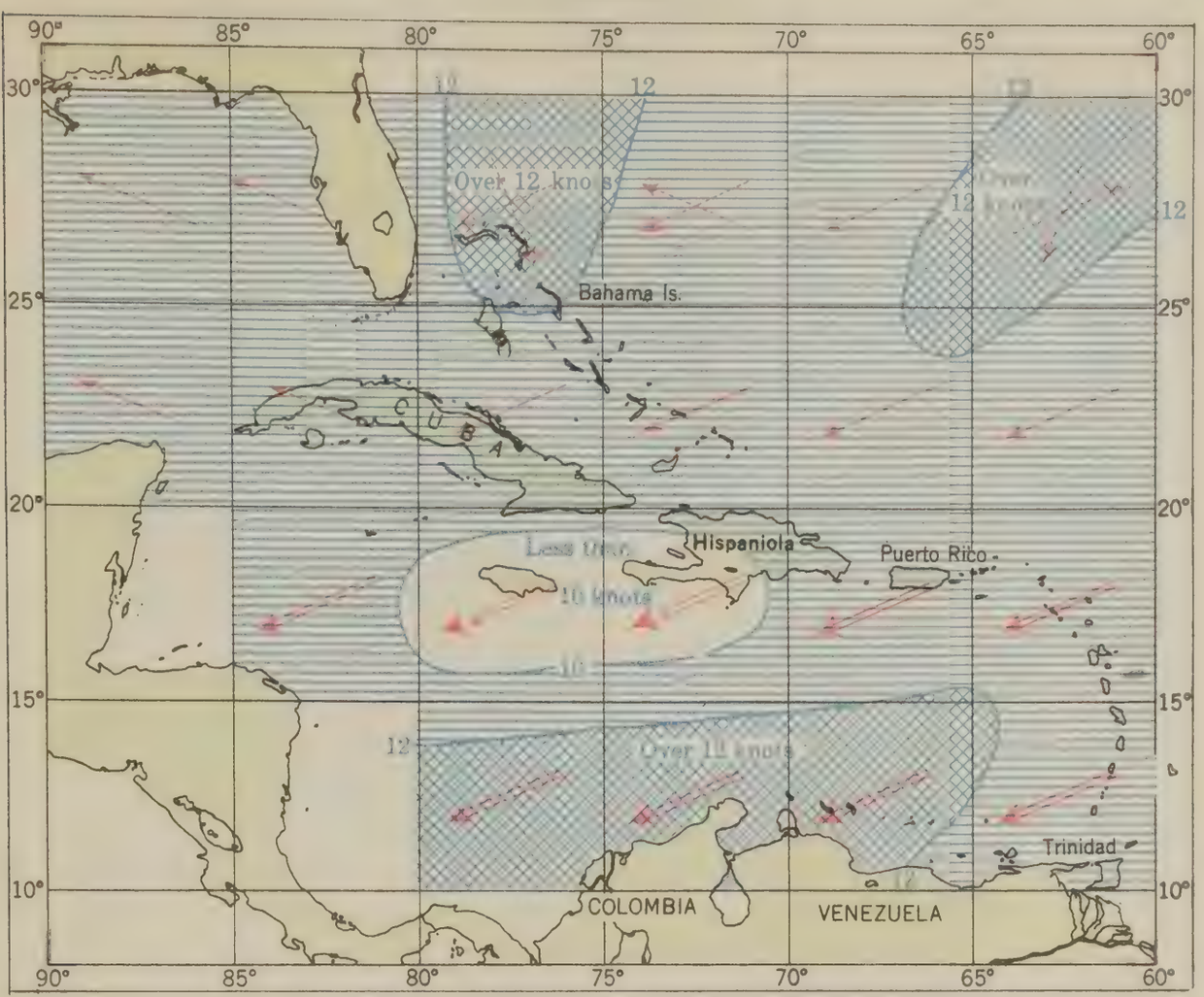


CHART 5.—February.

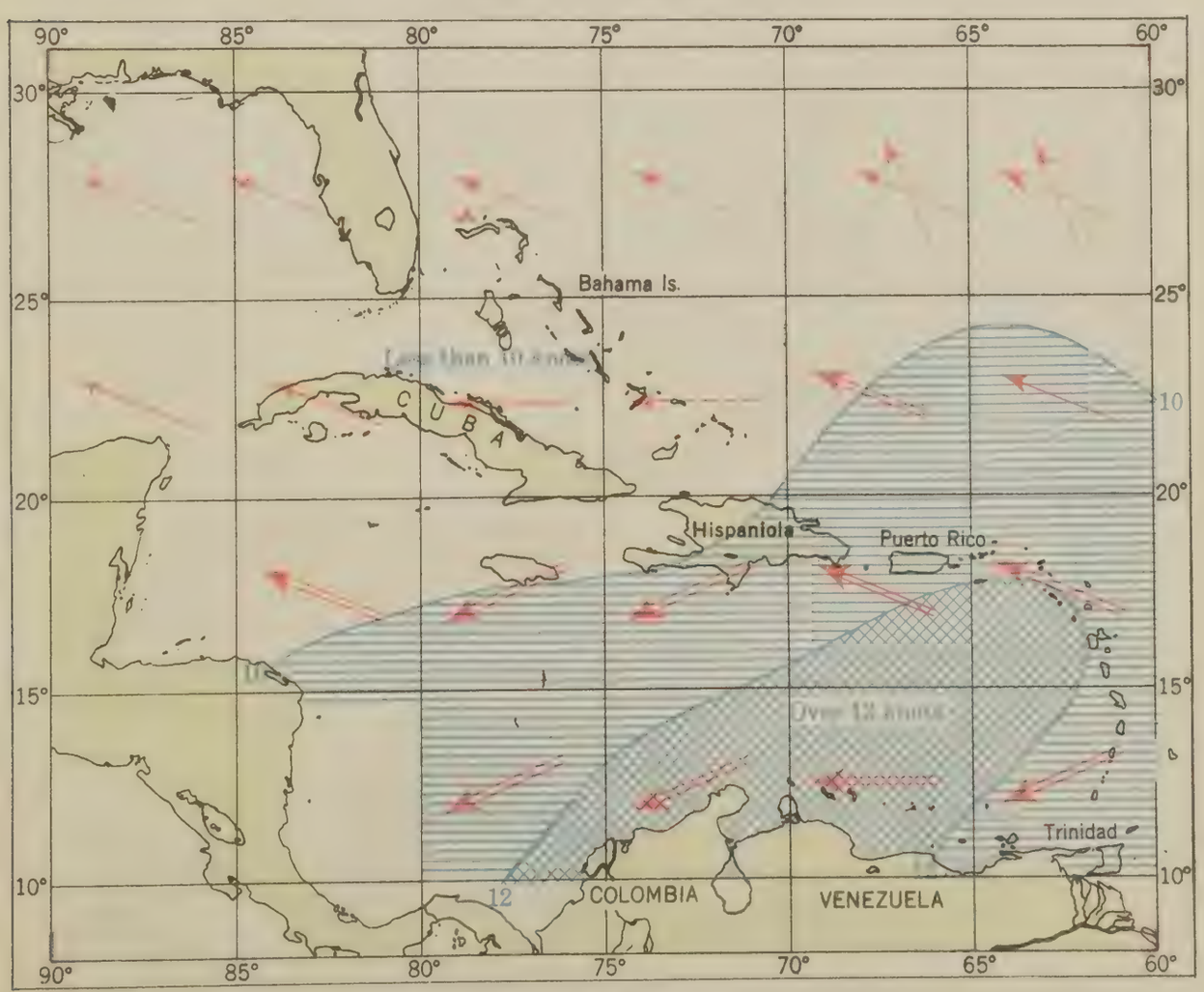


CHART 6.—May.

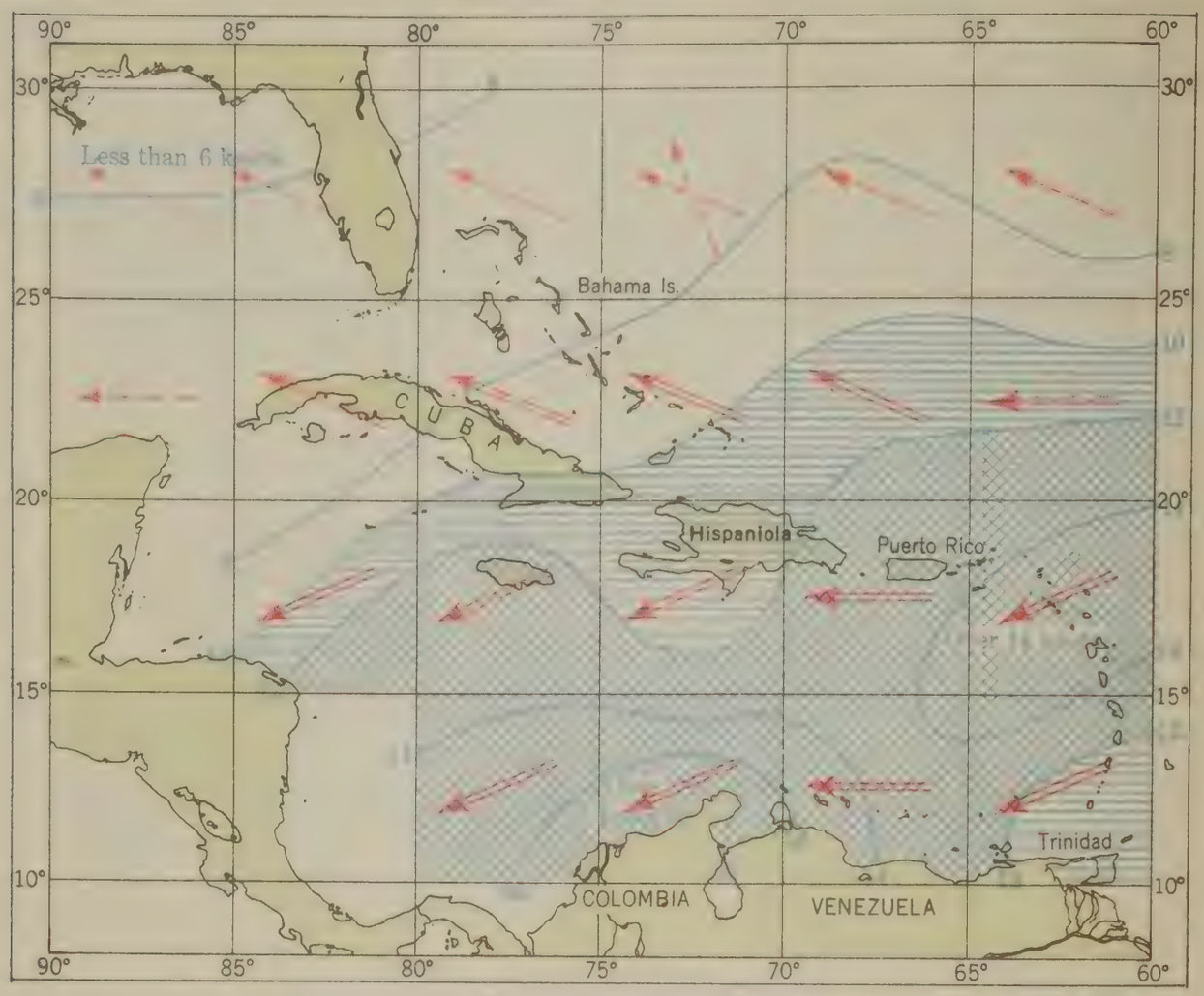


CHART 7.—July.

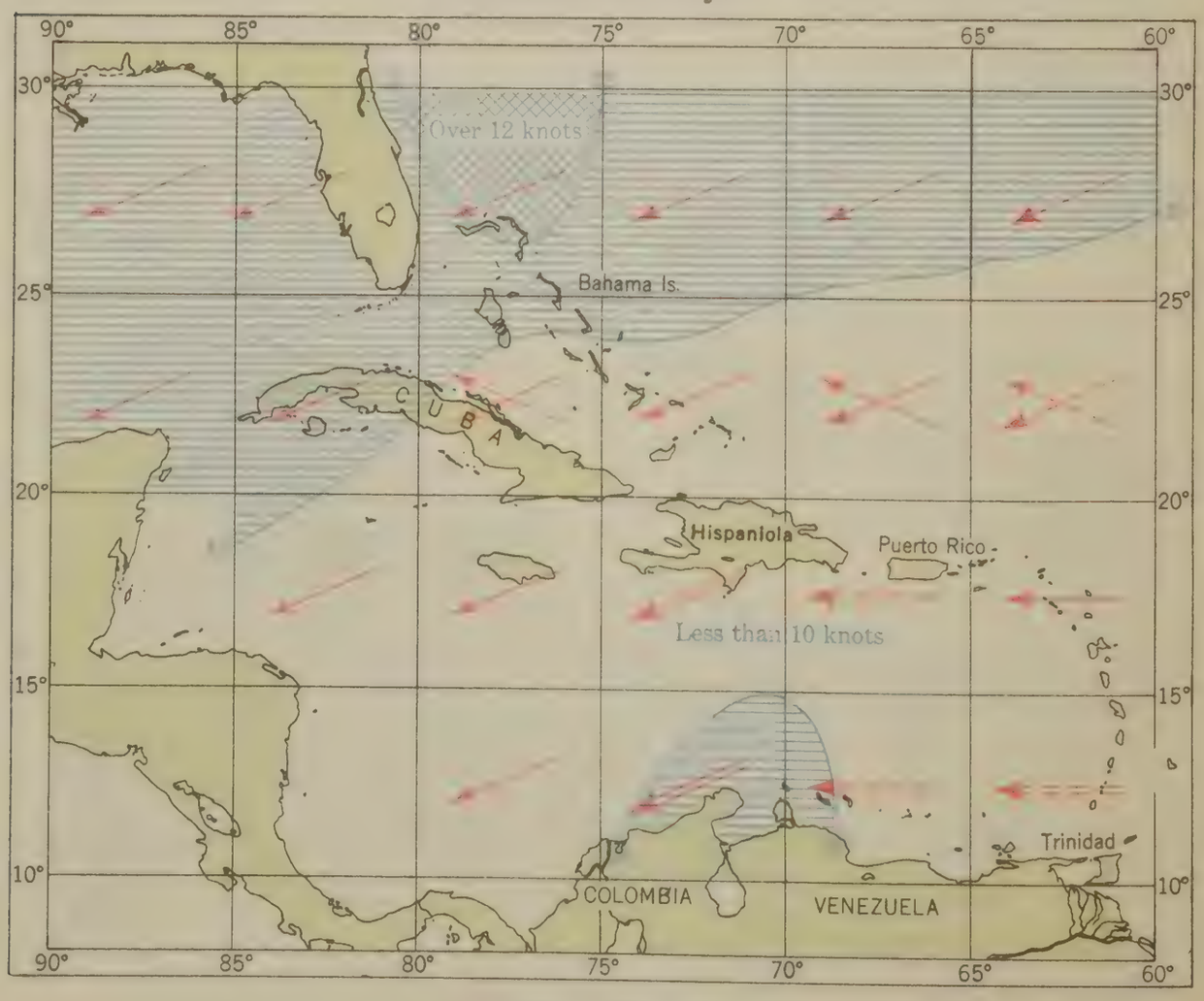


CHART 8.—October.

AVERAGE SURFACE WIND DRIFT DIRECTION, CONSTANCY AND FORCE—Continued

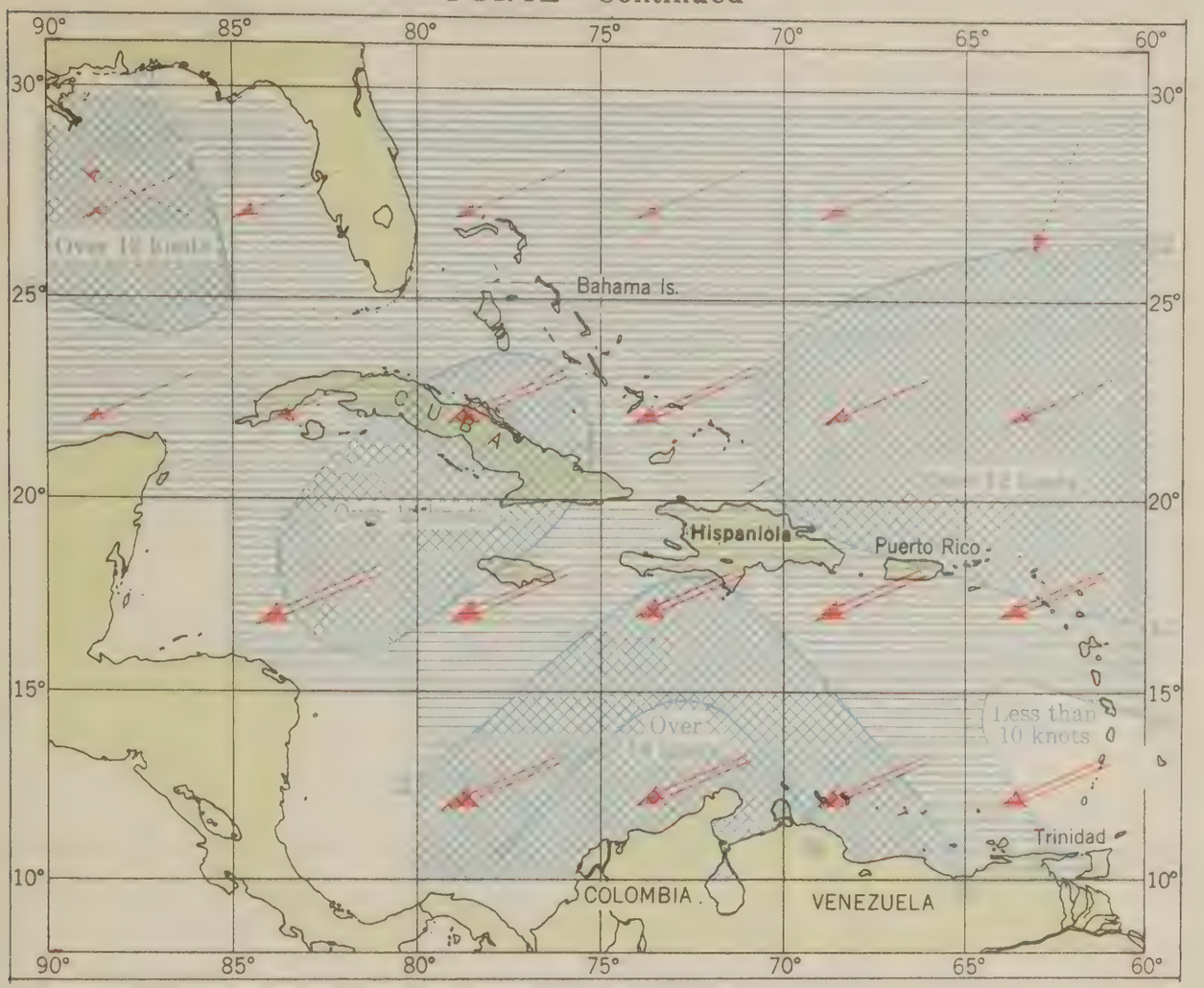


CHART 9.—December.

DISTRIBUTION OF WIND FORCES

Charts 10 to 14.—Explanation

Top or upper figure.—Percentage of the total wind observations which recorded calms is shown to whole numbers in each 5° square.

Second figure.—Percentage of wind observations with Beaufort force 1 to 3, inclusive.

Third figure.—Percentage of wind observations with Beaufort force 4 to 6, inclusive.

Fourth or bottom figure.—Percentage with Beaufort force 7 or over.

#Less than 0.5 percent.

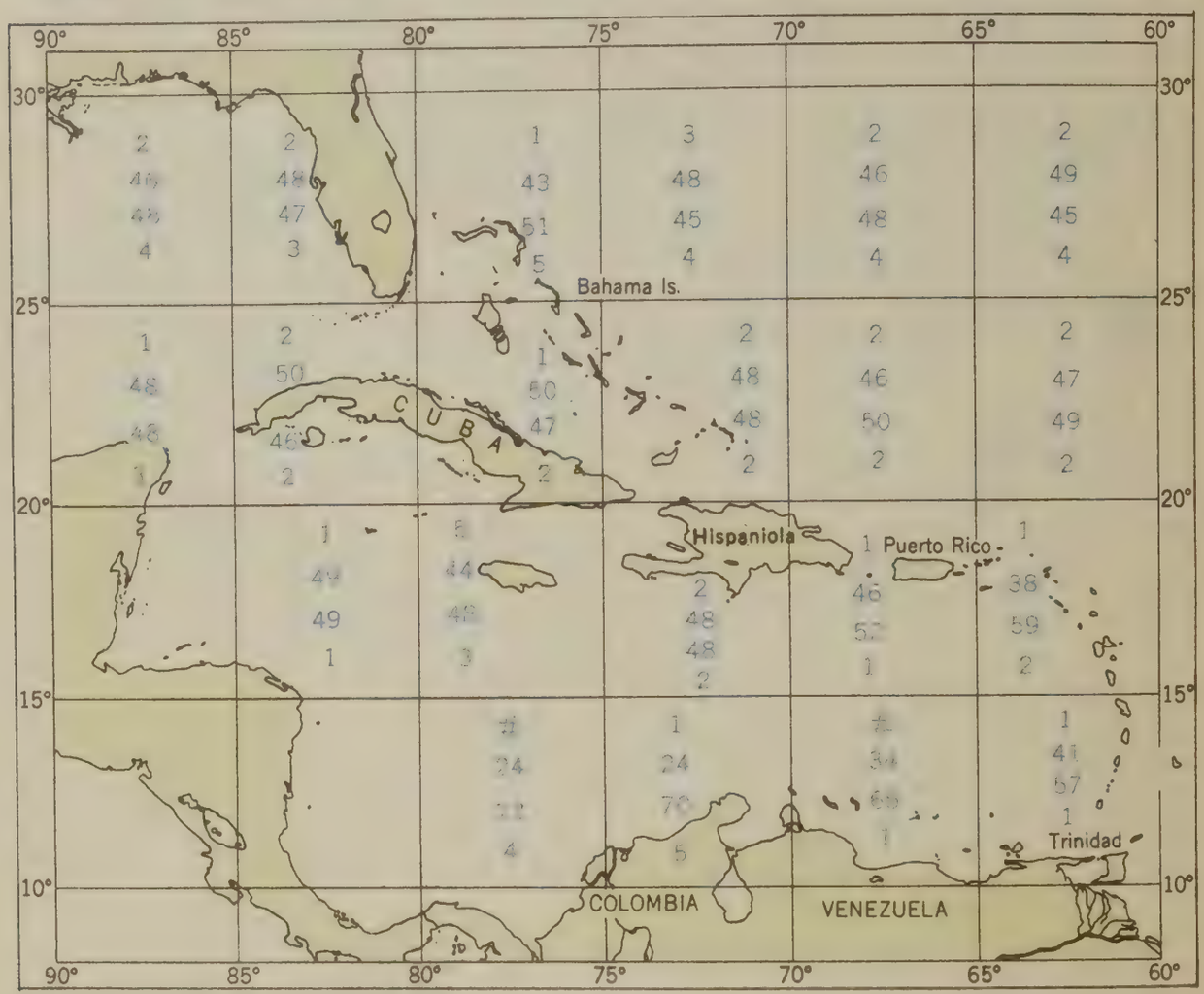


CHART 10.—February

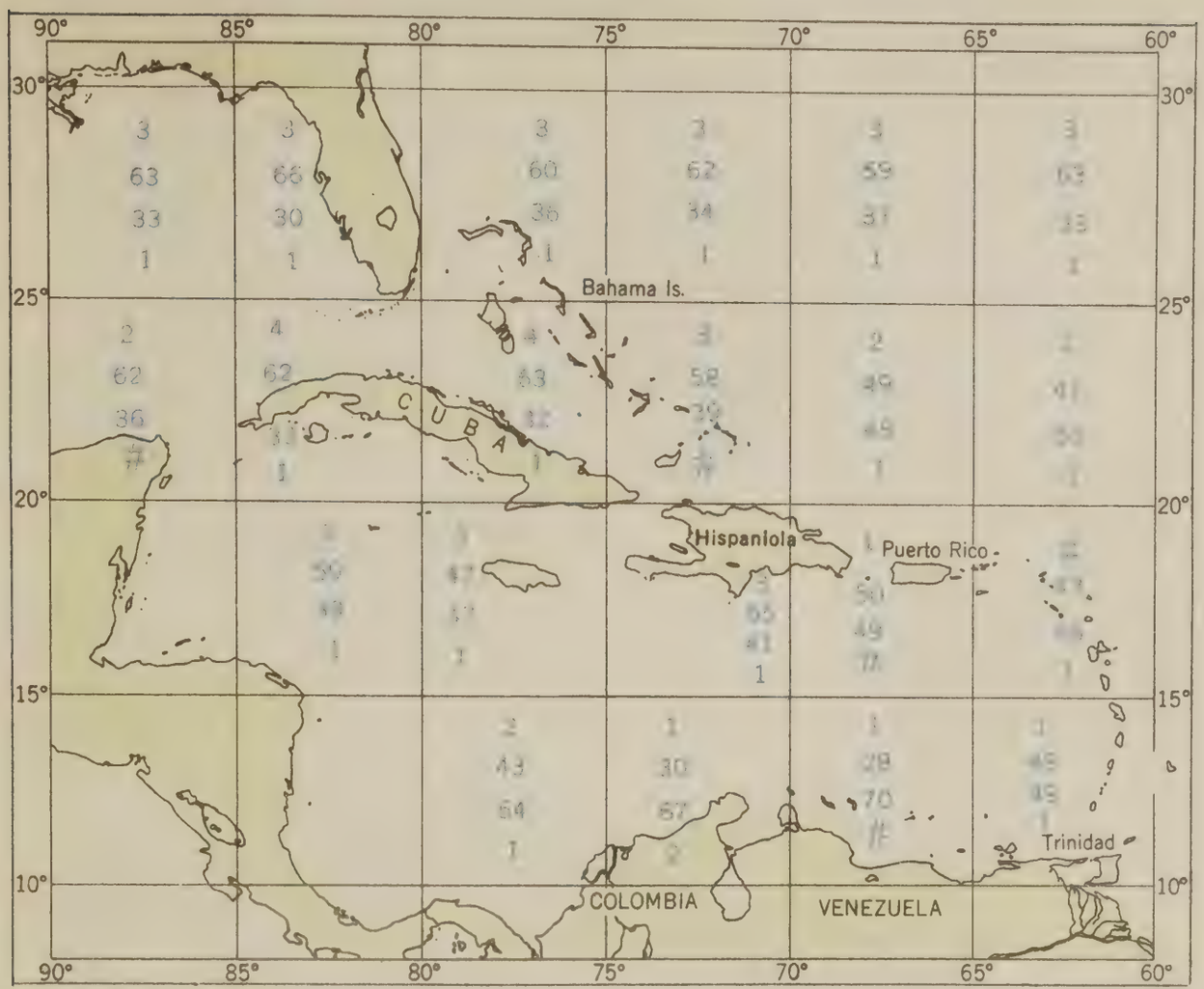


CHART 11.—May.

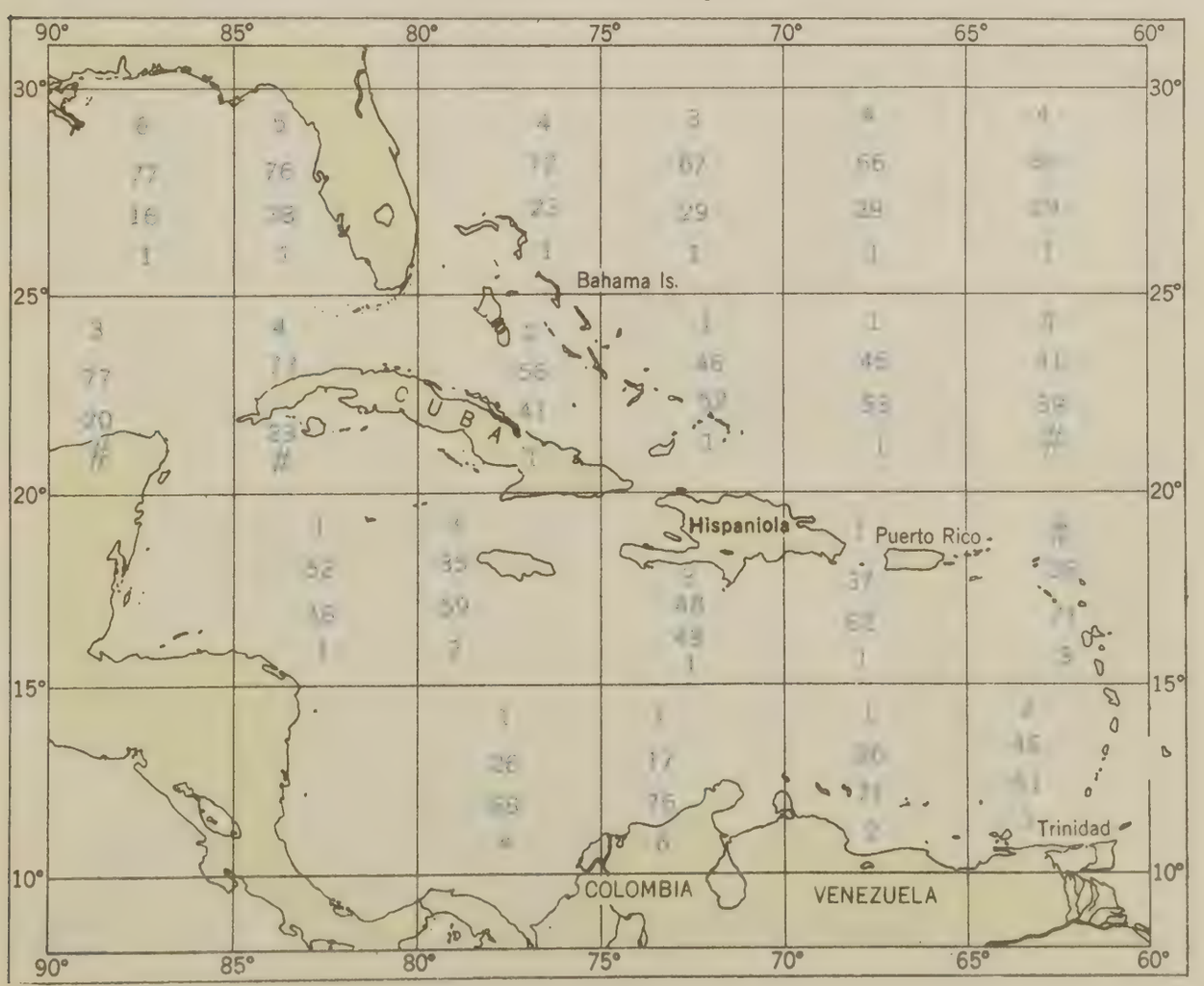


CHART 12.—July.

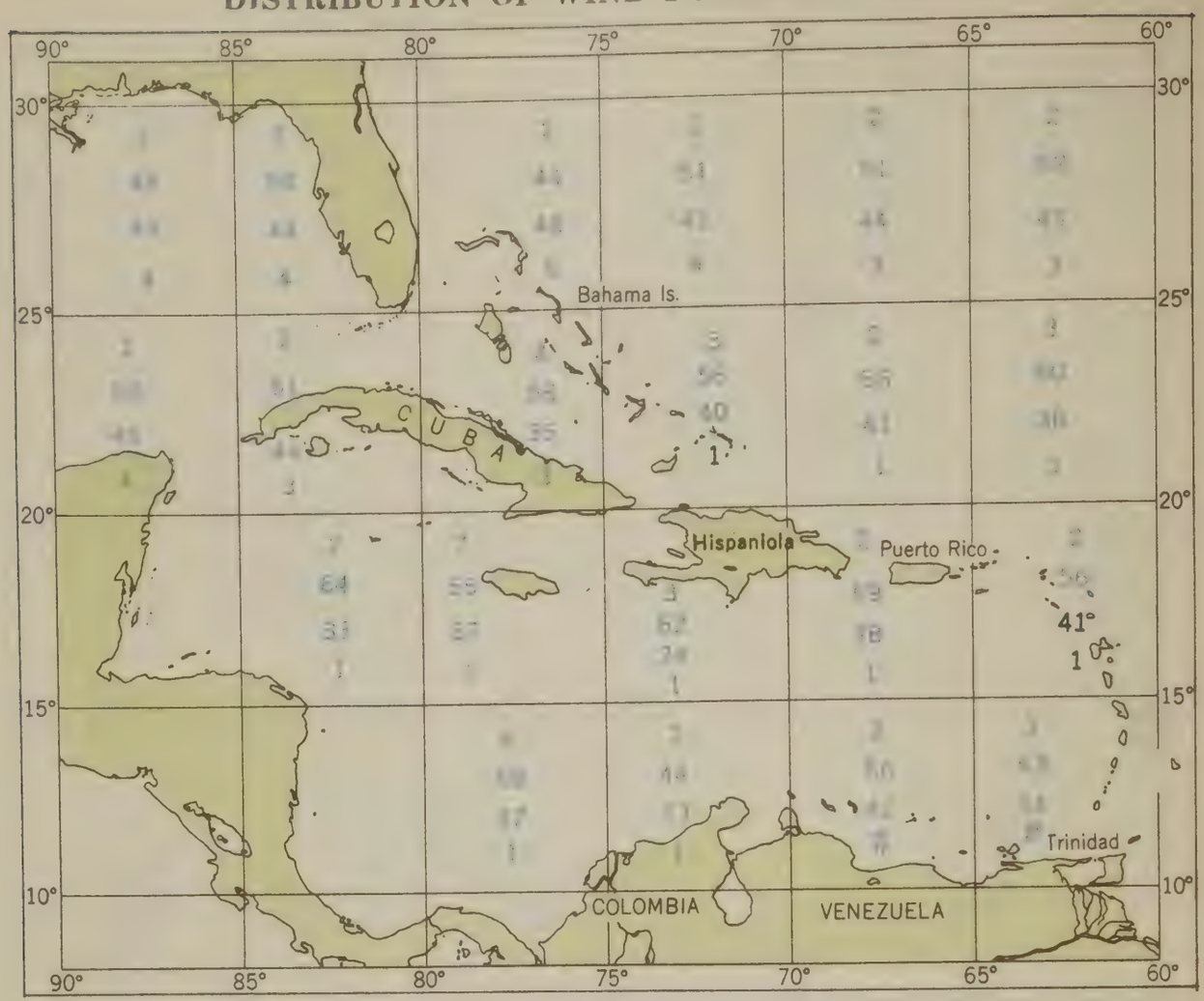


CHART 13.—October.

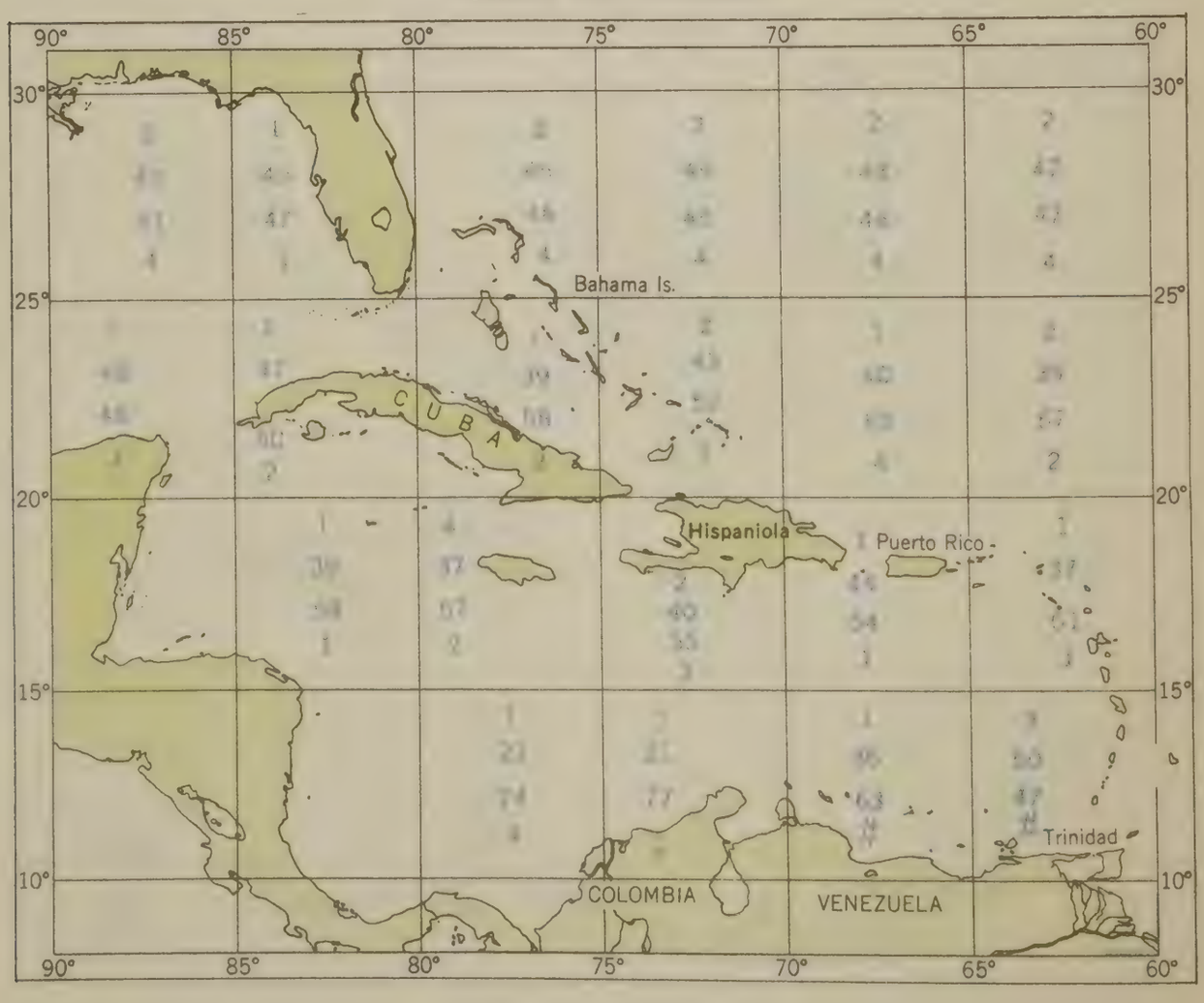


CHART 14.—December.

DIRECTION OF MIDDLE CLOUD MOVEMENT

Symbols shown on charts 15 and 16

The most frequent direction taken by middle type clouds is indicated by the arrow

Constancy:

80 percent or more ----------

60 to 79 percent ----------

40 to 59 percent ----------

Less than 40 percent ----------

When two directions are nearly equal in frequency two arrows are shown.

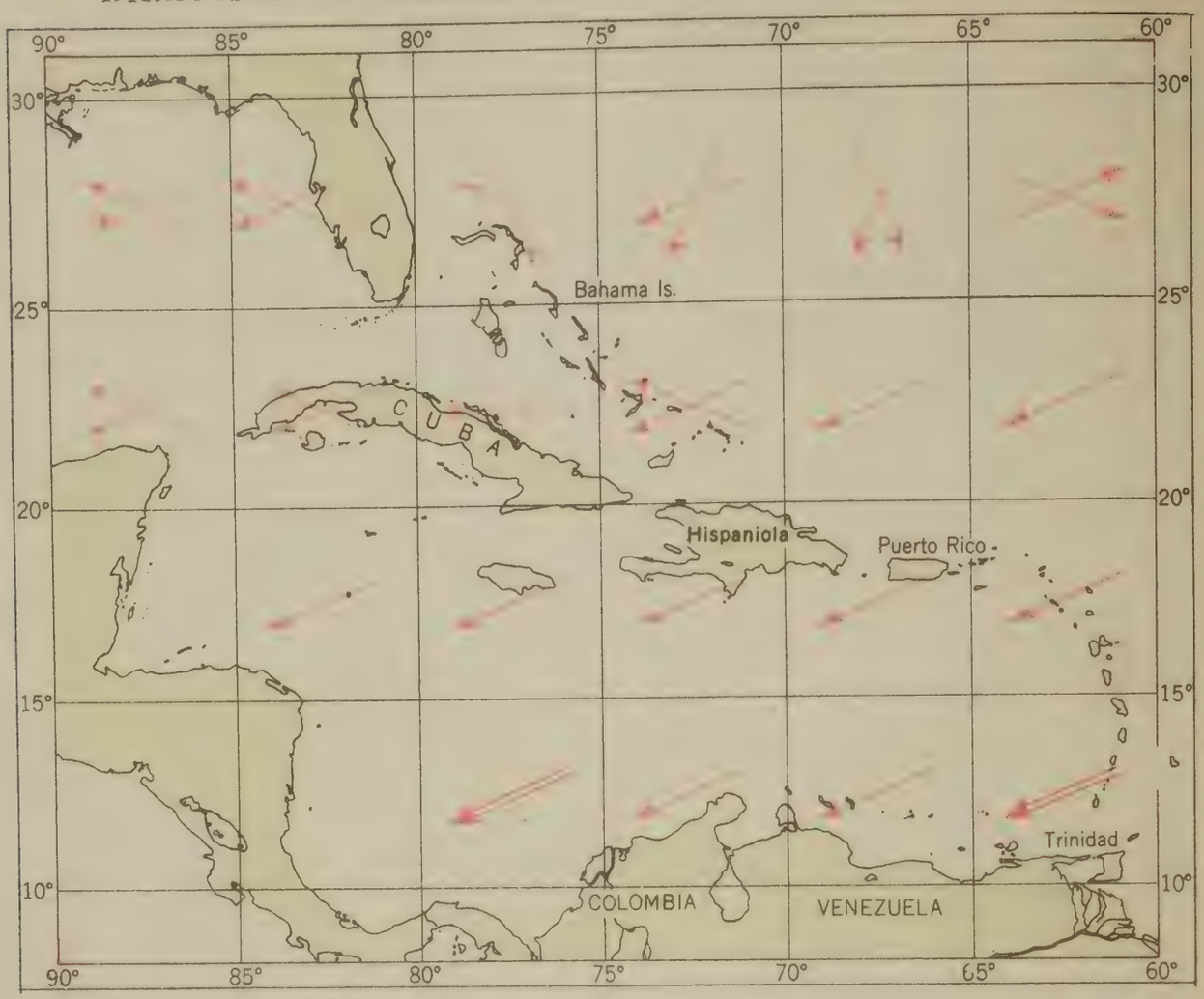


CHART 15.—February



CHART 16.—September

FACTORS AFFECTING VISIBILITY

Charts 17 to 21.—Explanation

The percentage of observations with lower type clouds is recorded in whole numbers in the upper right corner of each 5° square.

Top or upper figure.—Percentage of observations with exceptional visibility is shown in whole numbers and tenths.

Second or middle figure.—Percentage of observations with haze.

Third or lower figure.—Percentage of observations with fog.

#Less than 0.5 percent.

For example.—In February in the square 25° N. to 30° N. and 85° W. to 90° W., 56 percent of the observations showed lower type clouds, 11⅒ percent showed exceptional visibility, 5⅒ percent recorded haze and seven-tenths of 1 percent recorded fog.

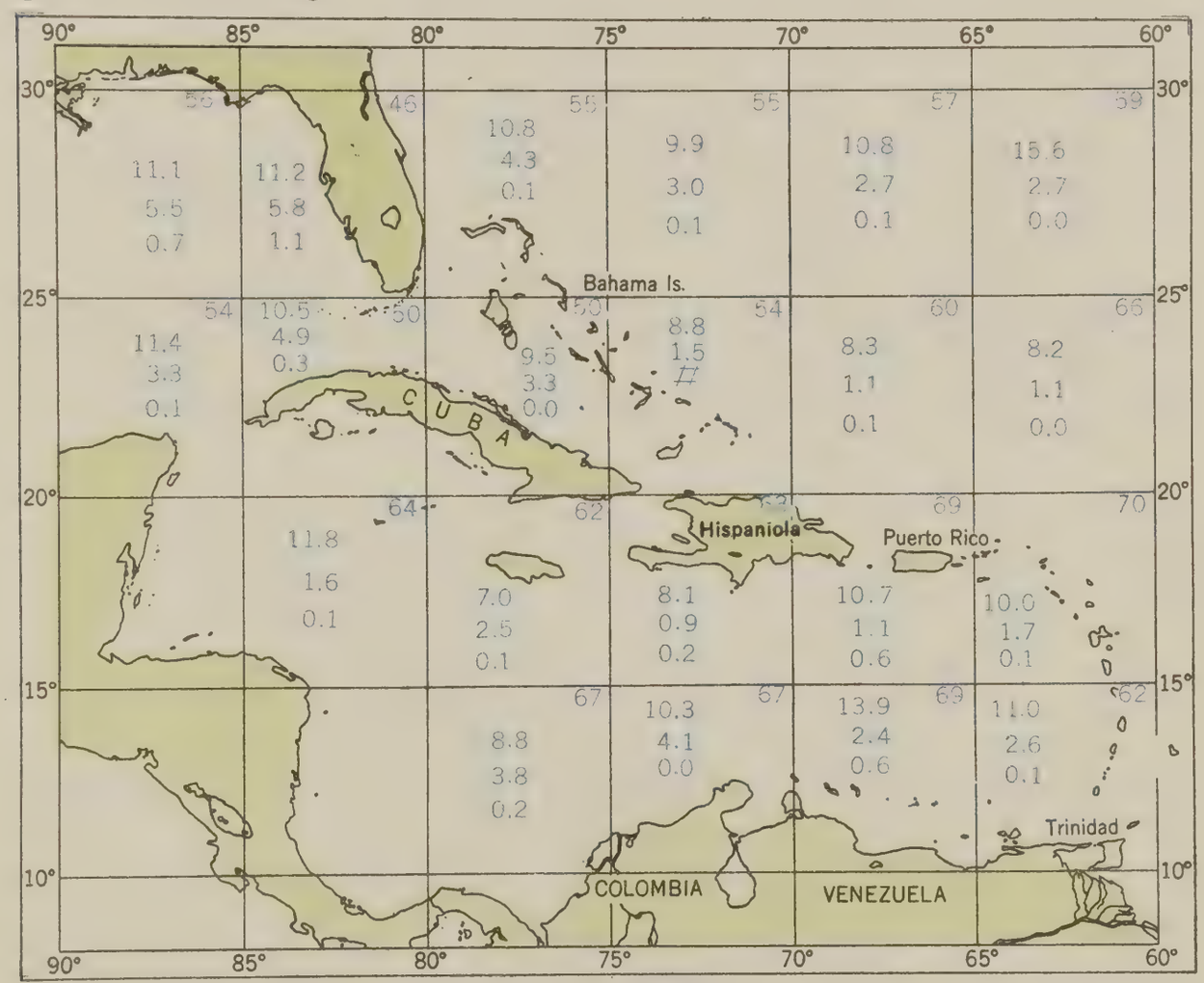


CHART 17.—February.

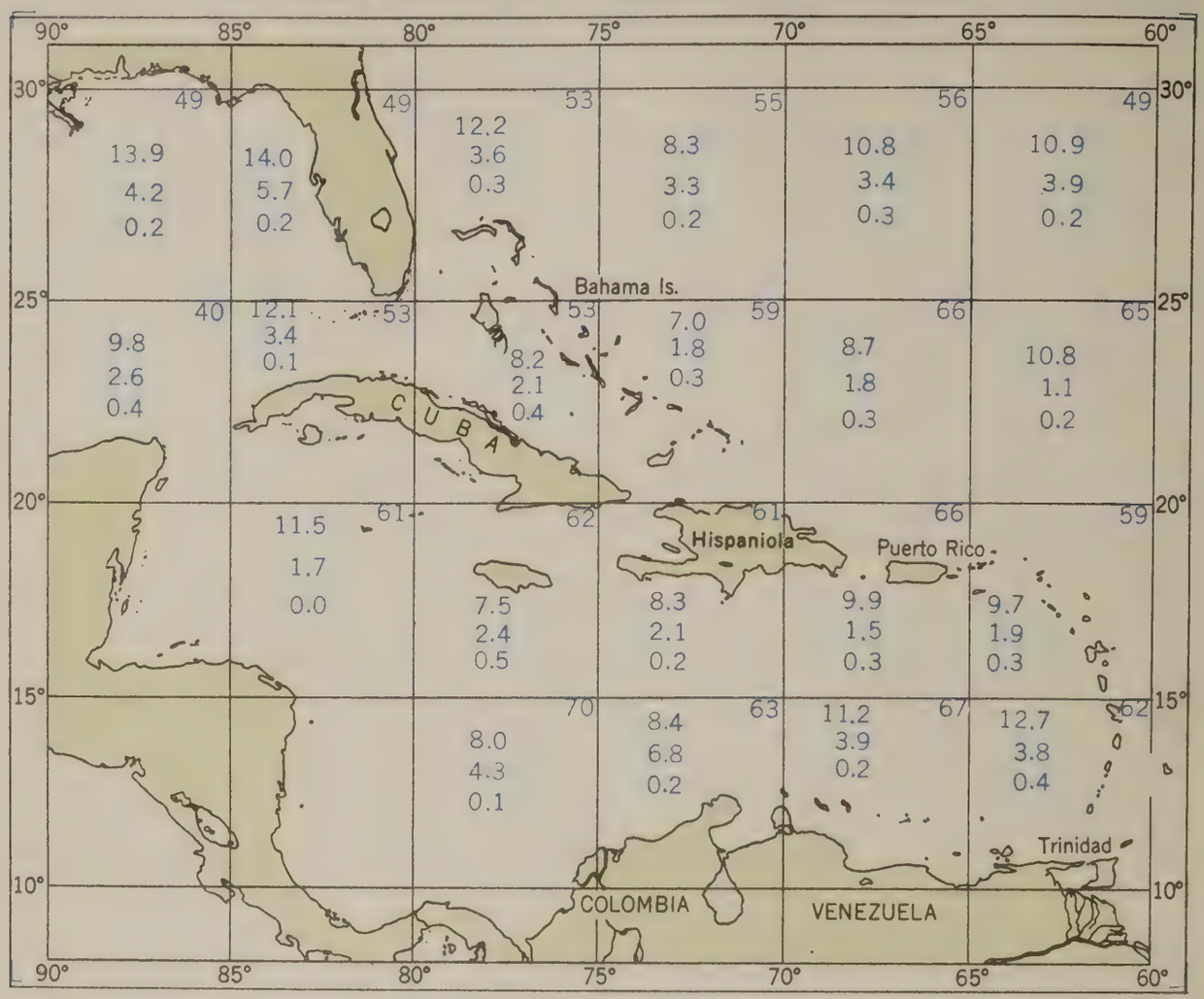


CHART 18—May.

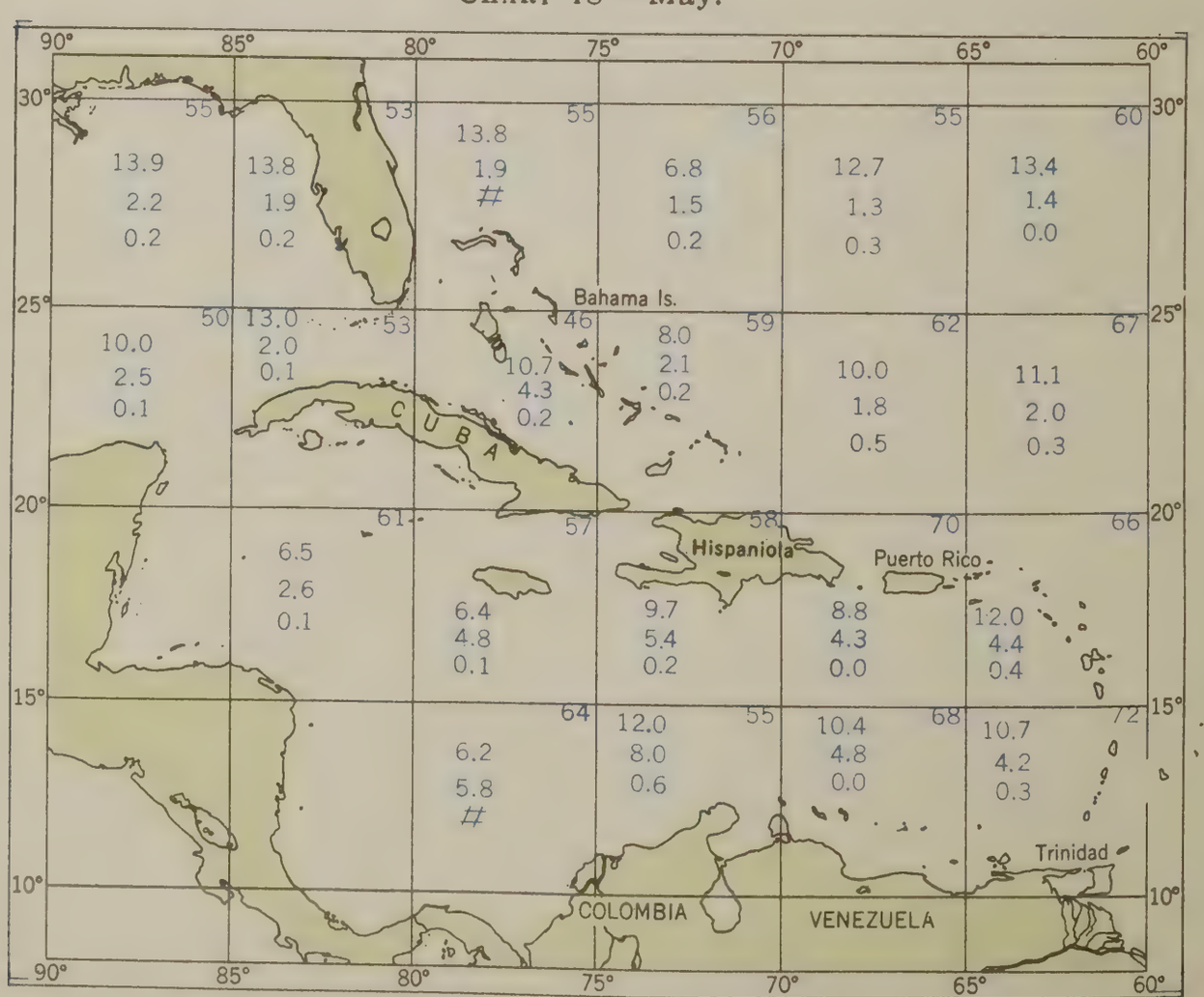


CHART 19.—July.

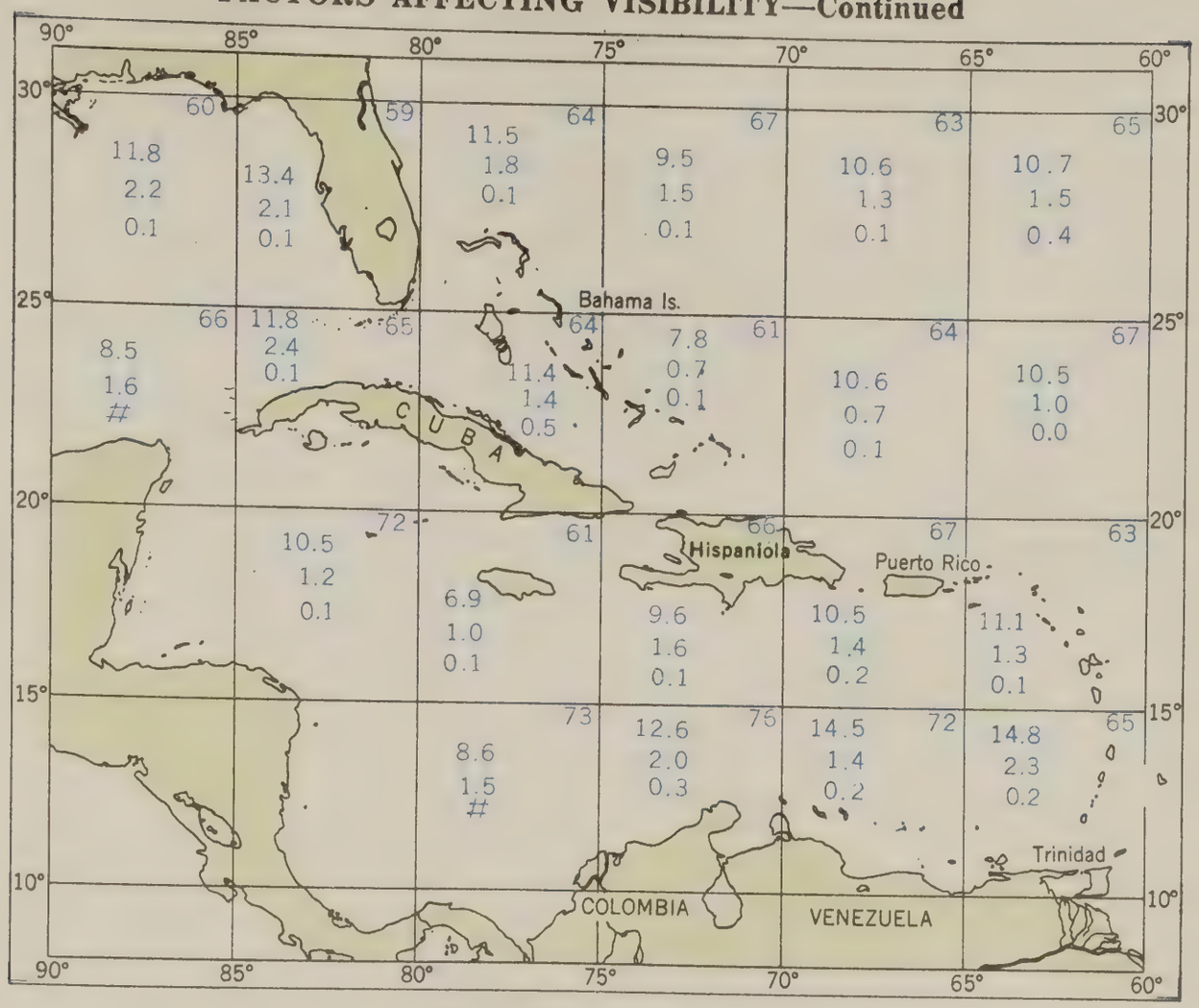


CHART 20.—October.

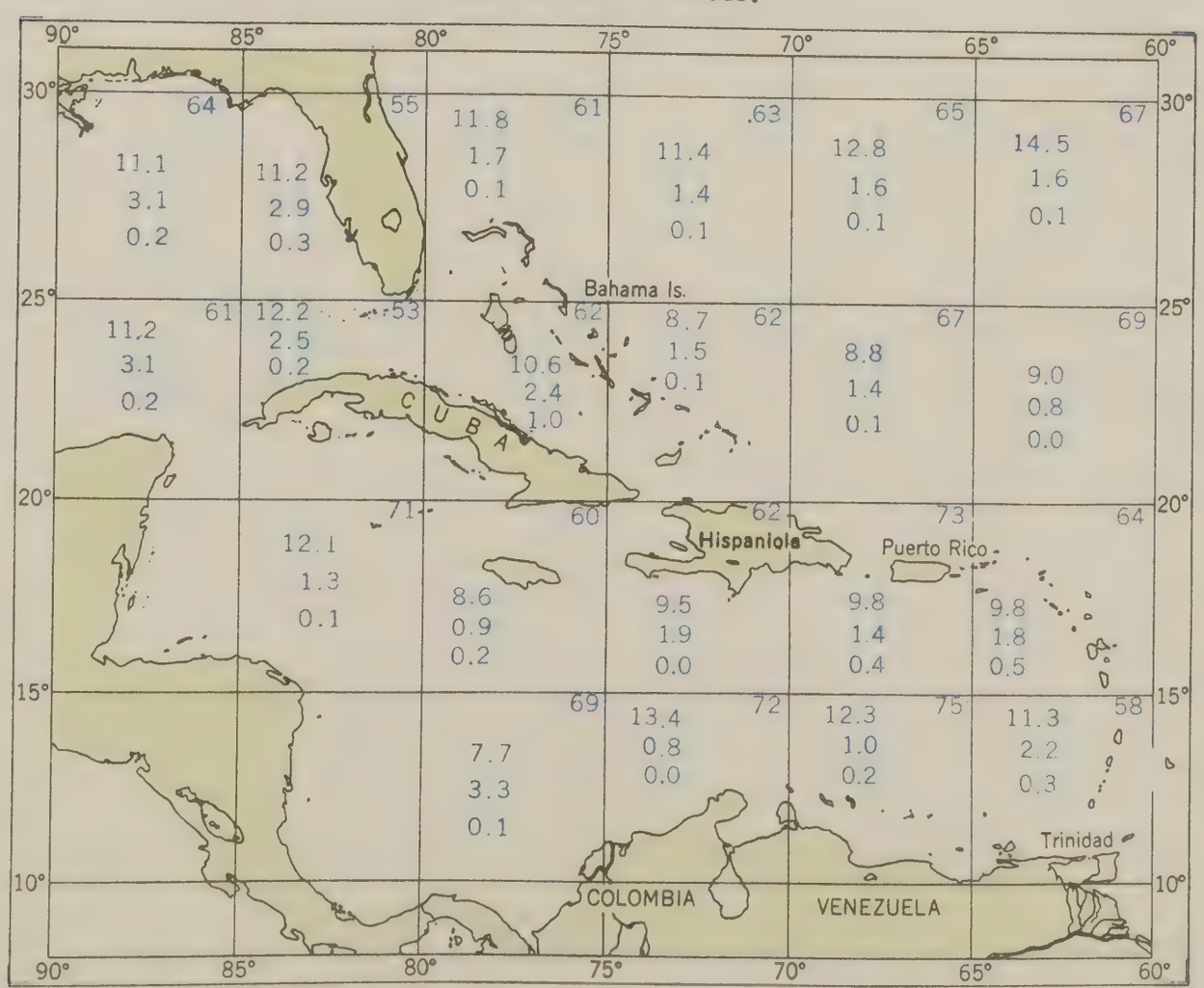


CHART 21.—December.

FREQUENCY OF RAIN AND DRIZZLE—THUNDERSTORMS AND SQUALLS

Charts 22 to 26.—Explanation.

Top or upper figures.—Percentage of rain or drizzle.
Second or middle figures.—Percentage of thunderstorms.
Third or lower figures.—Percentage of squalls.
#Less than one-twentieth of 1 percent.

The values given are percentages, in whole numbers and tenths, of observations (1880–1933) which recorded these elements.

For example.—In the 5° square 20° N. to 25° N. and 60° W. to 65° W. in the month of February, 2⁹⁄₁₀ percent of all observations showed rain or drizzle, one-tenth of 1 percent recorded thunderstorms, and 4⁵⁄₁₀ percent recorded squalls.

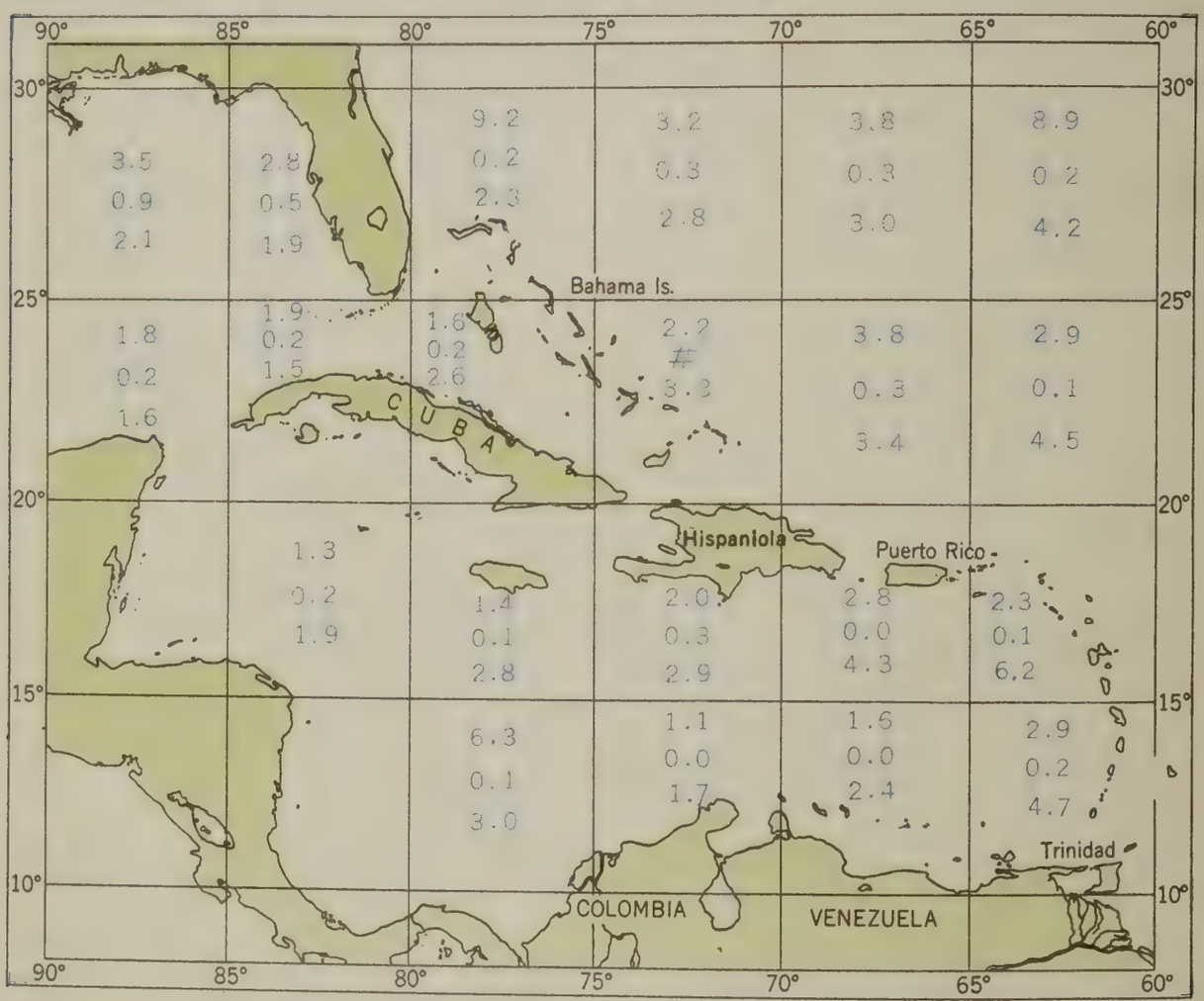


CHART 22.—February.

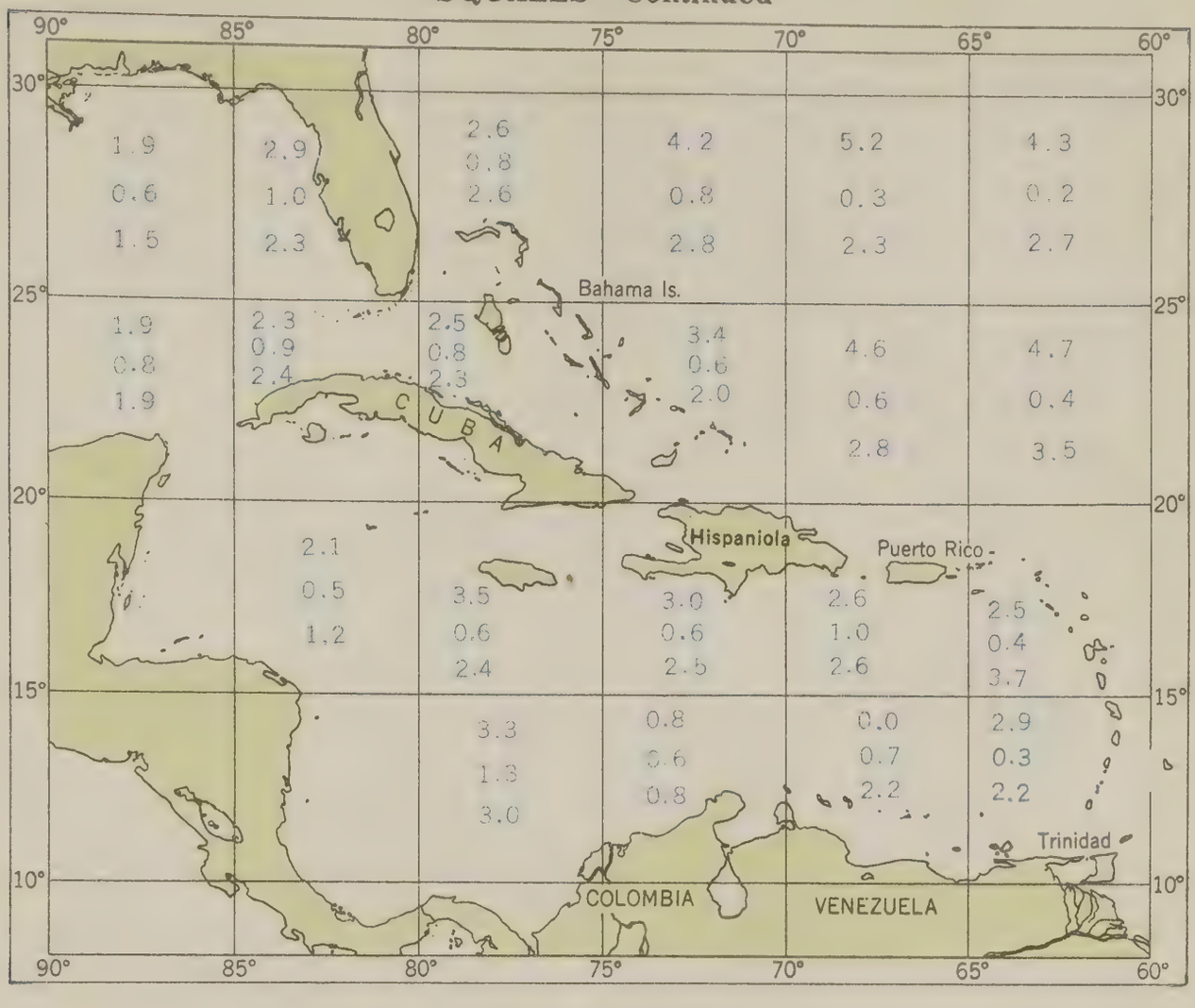


CHART 23.—May.

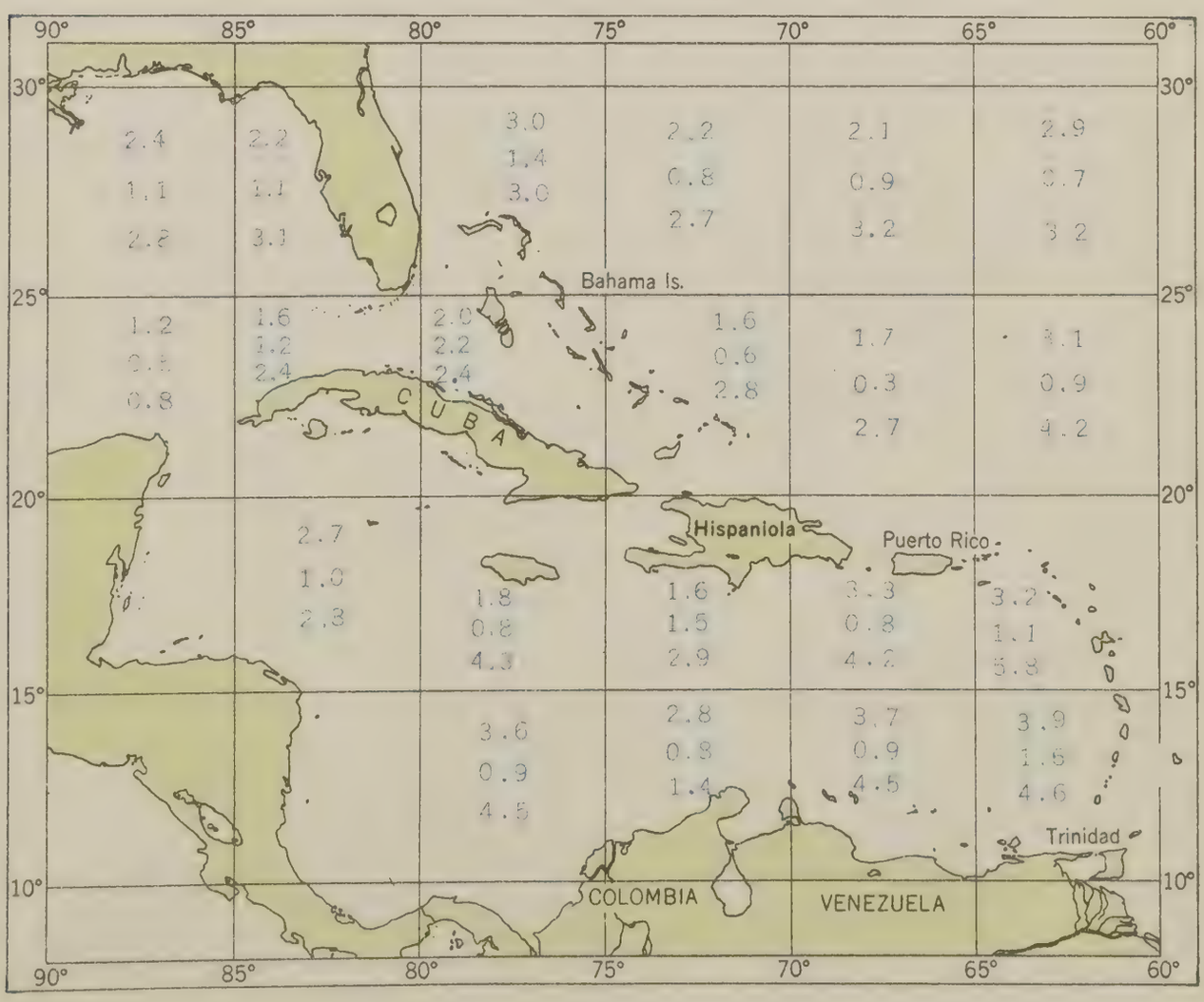


CHART 24.—July.

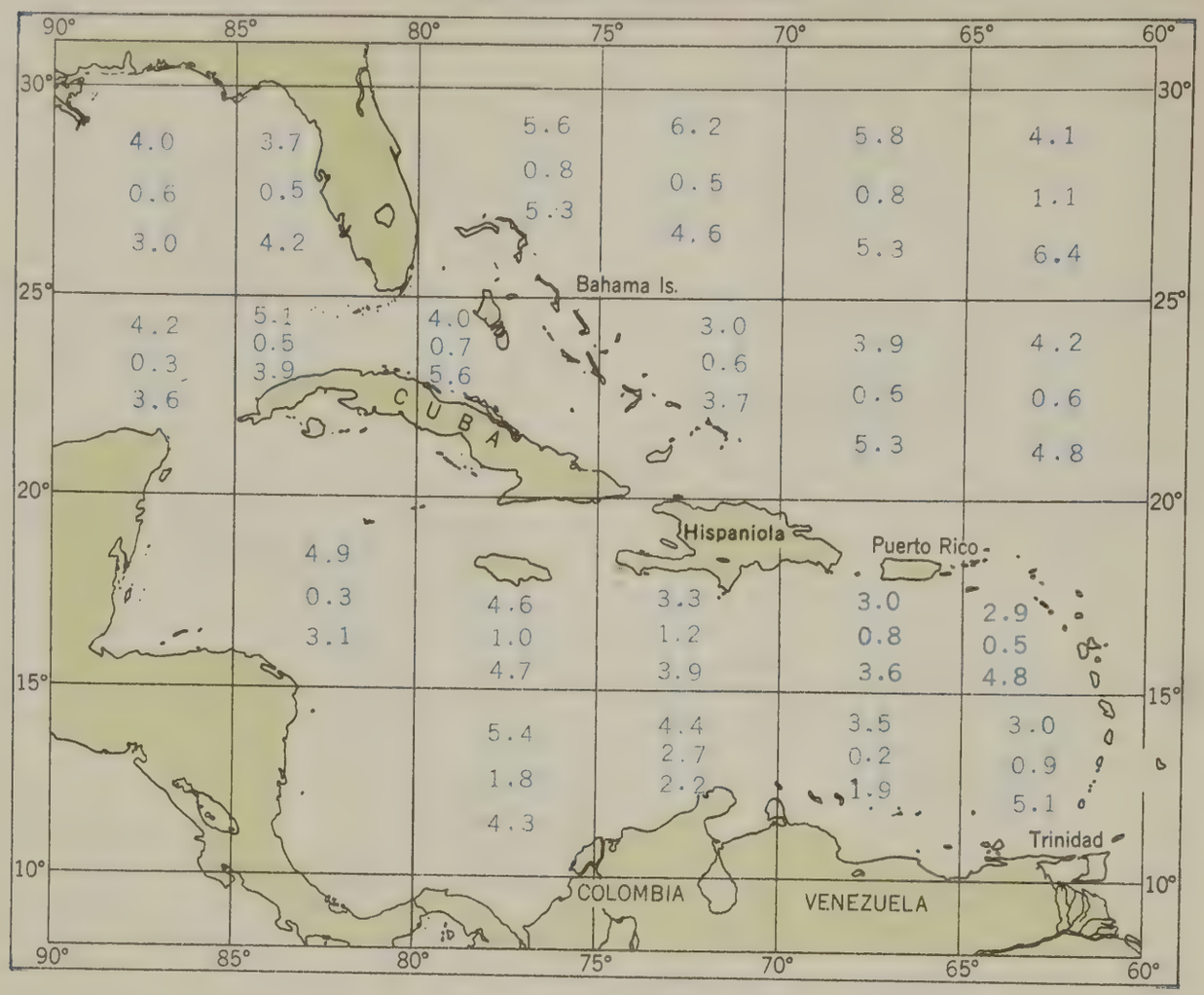


CHART 25.—October.

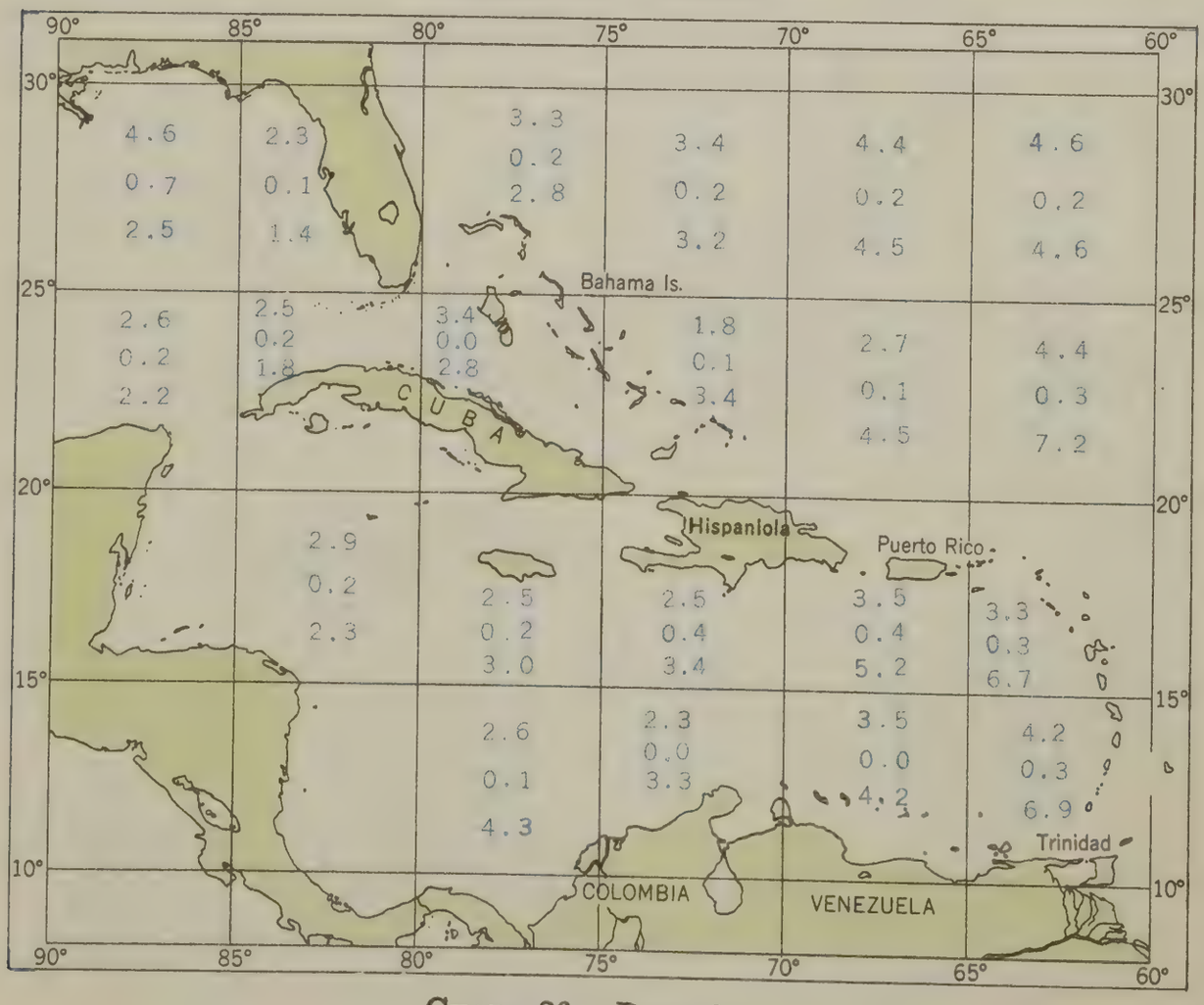


CHART 26.—December.

UPPER AIR WINDS

The upper air wind data included in this summary are based on the pilot-balloon records made at nine different points in the area. A list of the observation stations is given in the following table:

TABLE 2.—*List of stations, period of record and number of daily observations*

Stations	Period of record	Number of daily observations
Barranquilla, Colombia	January 1934–November 1937	1
Key West, Fla	July 1920–December 1936	α2
Kingston, Jamaica	May 1925–December 1936	1
Miami, Fla	November 1930–December 1936	3
Nuevitas, Cuba	January 1934–November 1936	Δ1
Port-au-Prince, Haiti	March 1926–July 1934	1
Port-of-Spain, Trinidad	January 1934–December 1936	Δ2
San Juan, Puerto Rico	June 1922–December 1936	*2
San Julian, Cuba	January 1934–November 1936	Δ1

α=3 observations daily for period 1931–36.
Δ=Observations made on only 12 to 20 days each month.
*=During summer and autumn months only from 1922 to 1925, inclusive.

It will be noted by reference to the above table that only relatively short records are available for Nuevitas and San Julian, Cuba, and Port-of-Spain, Trinidad. This fact should be borne in mind in considering the data presented in the tables and charts which follow.

As an examination of the monthly records indicated a distinct seasonal variation in the upper air wind records, especially over the northern part of the area, the summarized values are given for each of the four seasons: December, January, and February being considered as winter; March, April, and May as spring; June, July, and August as summer; September, October, and November as autumn. Values are given for the levels: Surface, 1,600, 3,300, 6,600, 9,800, and 13,100 feet above sea level for all stations except San Julian and Nuevitas, Cuba; Port-of-Spain, Trinidad; and Barranquilla, Colombia. For the latter four stations, data were not available for exactly the same levels so it was necessary to use the following upper levels: 2,000, 3,000, 6,000, 10,000, and 12,000 feet.

Wind velocities are given in knots and directions to 16 compass points. Wind roses are shown graphically in the accompanying charts while resultant winds, average velocities, and the percentage frequencies of different velocities are shown in tabular form.

Wind roses.—As the stations whose records are used herein lie between 10° and 26° north latitude, the so-called northeast trade winds are predominant in the lower levels over the entire area during all seasons. Over the northern part of the area, however, the "anti-trades" or westerly winds prevail in the higher levels (above 6,000 feet) during the winter and spring seasons. At Miami and Key West, Florida, moreover, westerly winds are also predominant above 13,000 feet during the autumn season. During the summer season the

trade winds prevail over the entire area at all levels up to 13,000 feet. It appears that the average level of reversal from easterly to westerly prevailing winds increases in altitude towards the south. For example, this level, during the winter season, is found to be at about 4,500 feet at Miami, Florida, and at 15,000 to 18,000 feet at Kingston, Jamaica, and San Juan, Puerto Rico. This reversal level also changes with the seasons, being lowest in late winter or early spring, and highest in late summer or early autumn. The prevailing directions of the trade winds at upper levels are, for the most part, between east-northeast and east-southeast, the chief variations from these directions being found either at the surface where at certain stations they are affected by land and sea breezes or near the "reversal" level. At Barranquilla, Colombia, the prevailing directions are southerly (i. e., between southeast and southwest) during the year as follows: Autumn, at all upper levels; summer, above 2,000 feet; winter and spring, at intermediate levels. Prevailing directions west of south (i. e., south-southwest and southwest) are confined to the 3,000- and 6,000-foot levels during autumn and the 3,000-foot level during summer. There is, in general, a seasonal shift in the prevailing directions toward the south from winter to summer and toward the north from summer to winter. The north and north-northeast winds at the surface which appear to prevail at Kingston, Jamaica, are apparently due to the fact that all the observations on which these records are based, were made at about 0730 local time when the land breeze is predominant.

It will be noted, from the wind roses, that average wind velocities, at all the upper levels, are in general, highest from the prevailing directions. Over the northwest portion of the area and at Barranquilla, Colombia, the highest average velocities occur during the winter season and the lowest during the summer season. Over most of the remainder of the area, however, the highest average velocities occur during the summer season with two periods of relatively low velocities occurring during the spring and autumn seasons, respectively. Except at Barranquilla, Colombia, the records are characterized by a rapid increase in wind velocity from the surface up to 1,500 or 2,000 feet, where, on the average, the maximum velocity is reached. It will be noted, however, that at Kingston, Jamaica, and Port-of-Spain, Trinidad, the maximum velocities occur at much higher altitudes, between 3,000 and 6,000 feet. This is believed to be due to the fact that both of these stations are located on the leeward side of their respective islands and that the mountain ranges to the north and east in both cases reduce the force of the trade winds in the lower levels. The average values, for the level of maximum velocities, vary at different stations from 13 to 17 knots during autumn, winter, and spring seasons, and from 11 to 20 knots during the summer season. Above the level of maximum velocity there is a gradual decrease in velocity

with height up to the reversal level where the antitrades or westerly winds become predominant. Then there is a second increase in velocity with height in the antitrades. At Barranquilla, Colombia, however, the average velocities are lower than at the other stations in the area at all upper levels. These velocities *decrease* with height above the surface up to 6,000 feet during winter, spring and summer and up to 10,000 feet during the autumn season and then *increase* with height above those levels up to at least 12,000 feet.

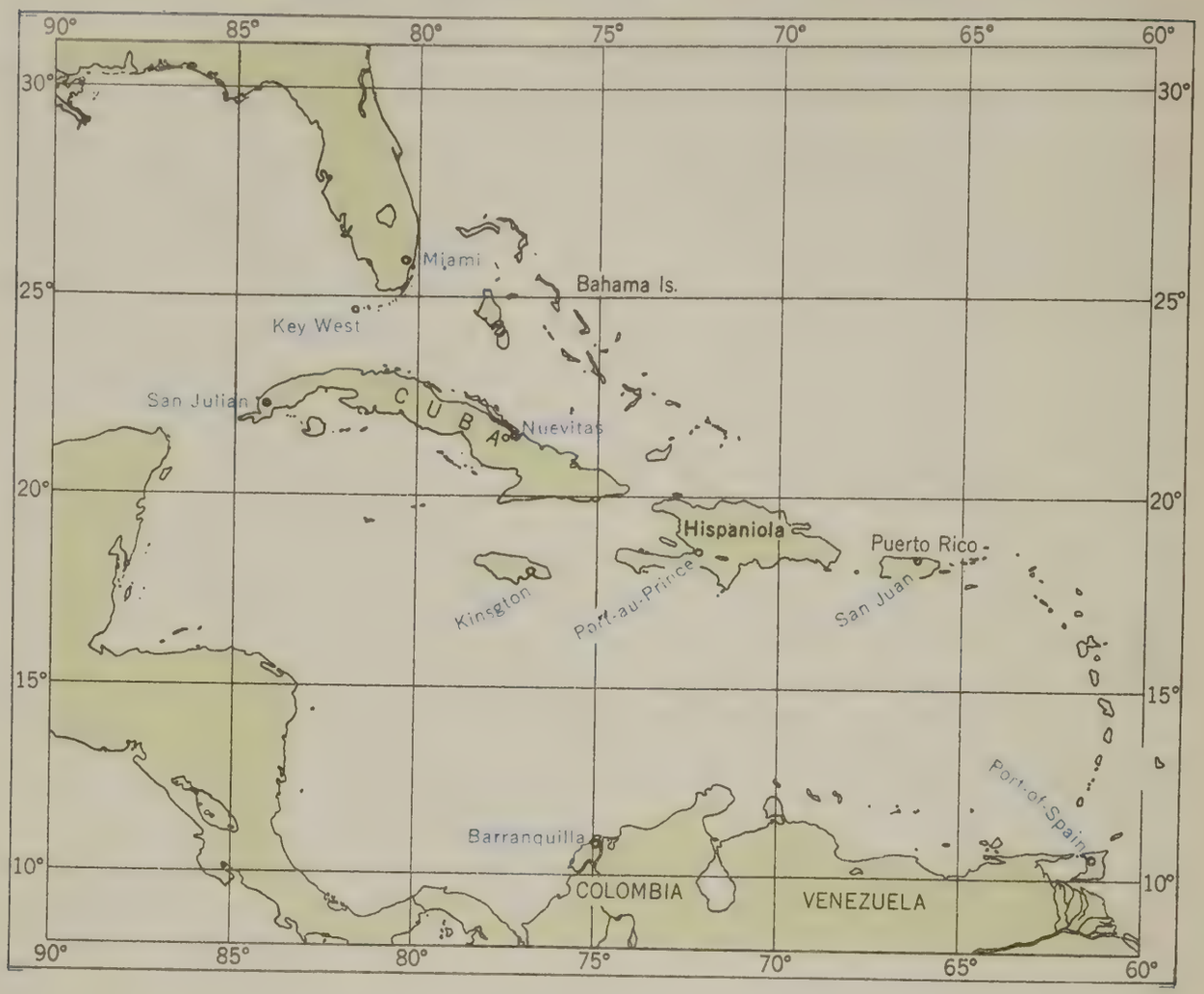
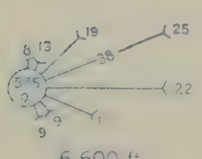


CHART 27.—Location of upper air stations.

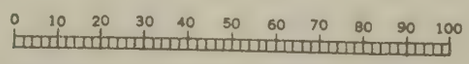
DESCRIPTION OF WIND ROSES—CHARTS 28 TO 36

Charts 28 to 36 display roses of average winds in the upper air for specific levels, indicated by heights beneath the roses. All observations were taken at the same place and time.

The arrows fly *with* the wind and their length, measured on the scale below, from the outside of the circle, gives the percentage of time the wind was observed to blow from or near the given point. The figures at the beginning of the arrows show the average speed in knots. In the center of the circle, the upper figures give the number of observations upon which the roses were constructed and the lower figures give the percentage of calms and winds of less than 1 knot. Where the percentage of frequency of the winds was less than 2 percent no arrow is shown. In some instances the full length of the arrow could not be shown and the line was therefore, broken and the total percentage given between the broken lines.

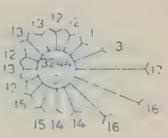
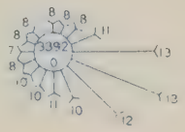
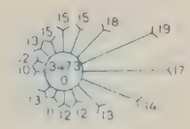
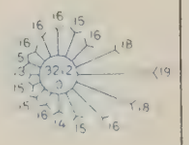
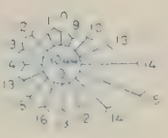
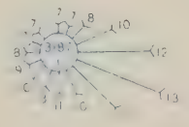
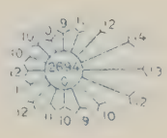
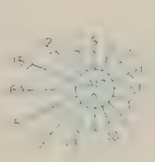
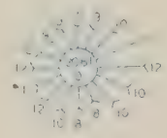
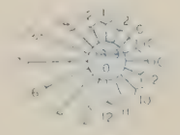
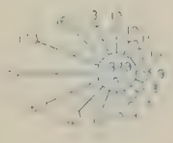
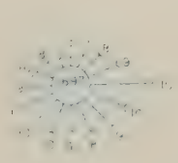
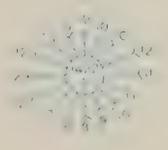
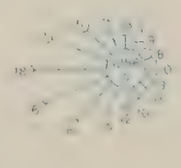


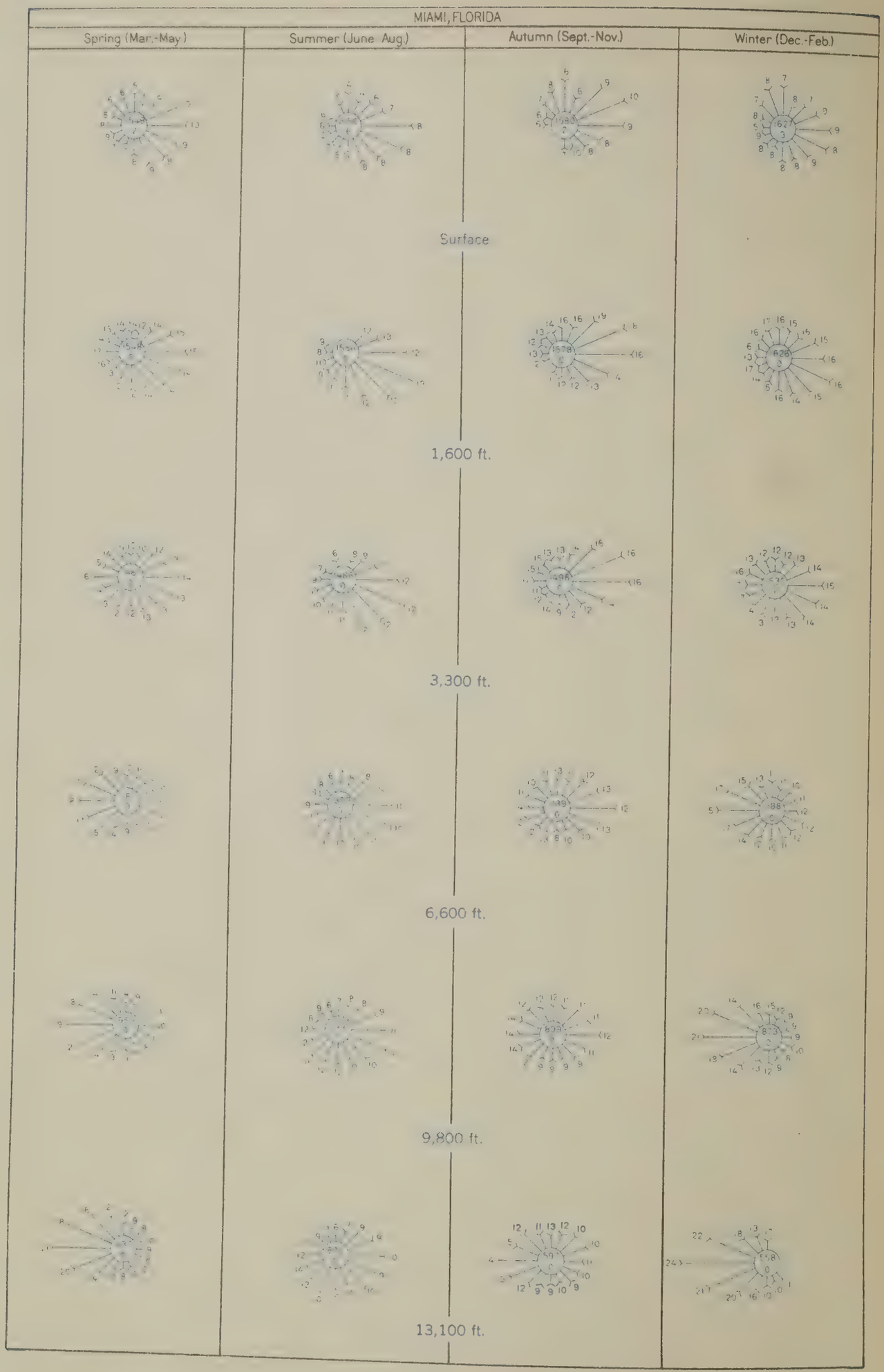
Example.—Percentage of frequency; direction and average speed: 2 from N, with an average speed of wind from that direction of 8 knots; 2 from NNE., average speed 13 knots; 12 from NE., 19 knots; 38 from ENE., 25 knots; 27 from E., 22 knots; 7 from ESE., 11 knots; 3 from SE., 9 knots; 3 from SSE., 9 knots; 575 observations; percentage of calms 0.

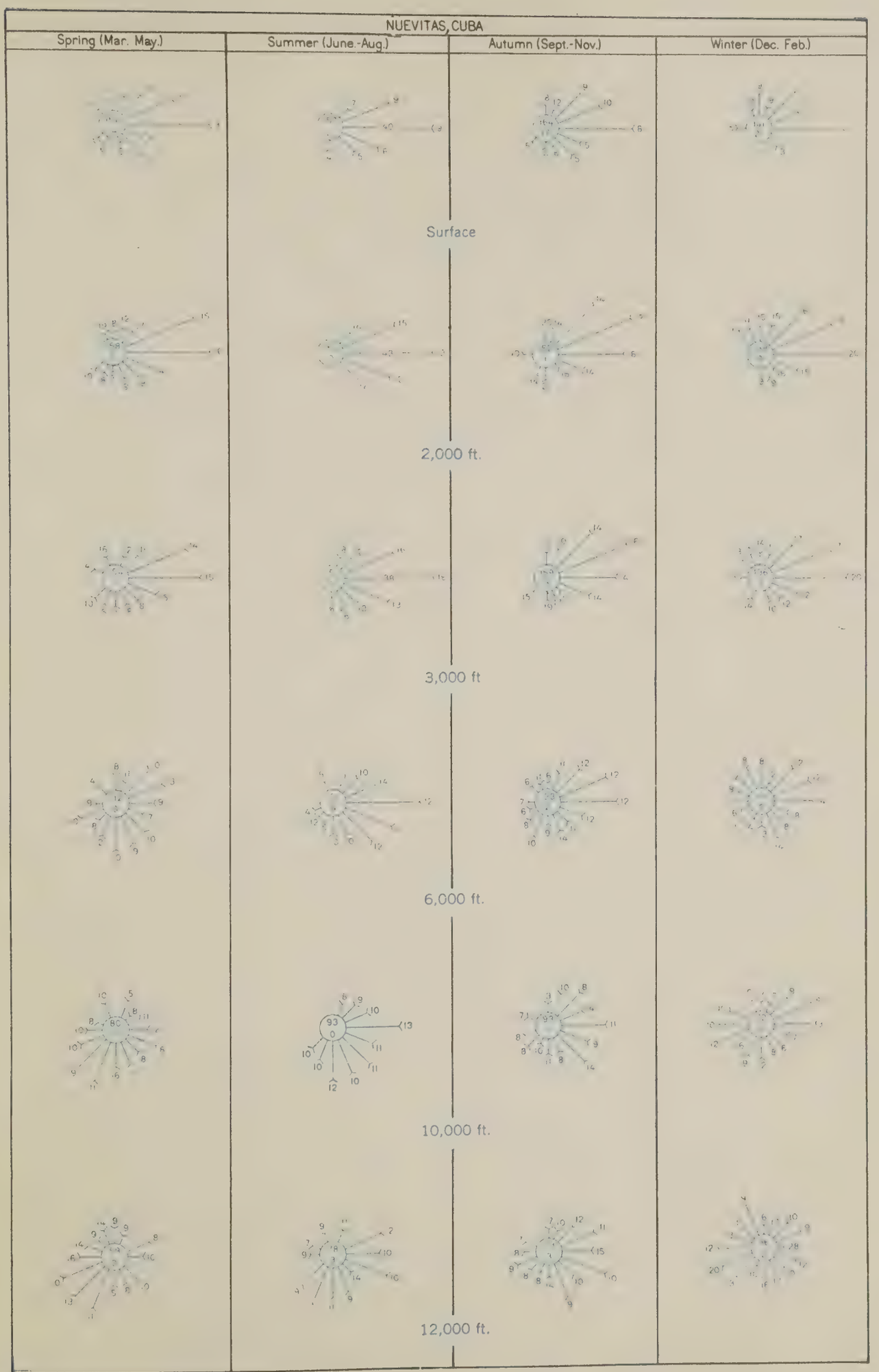


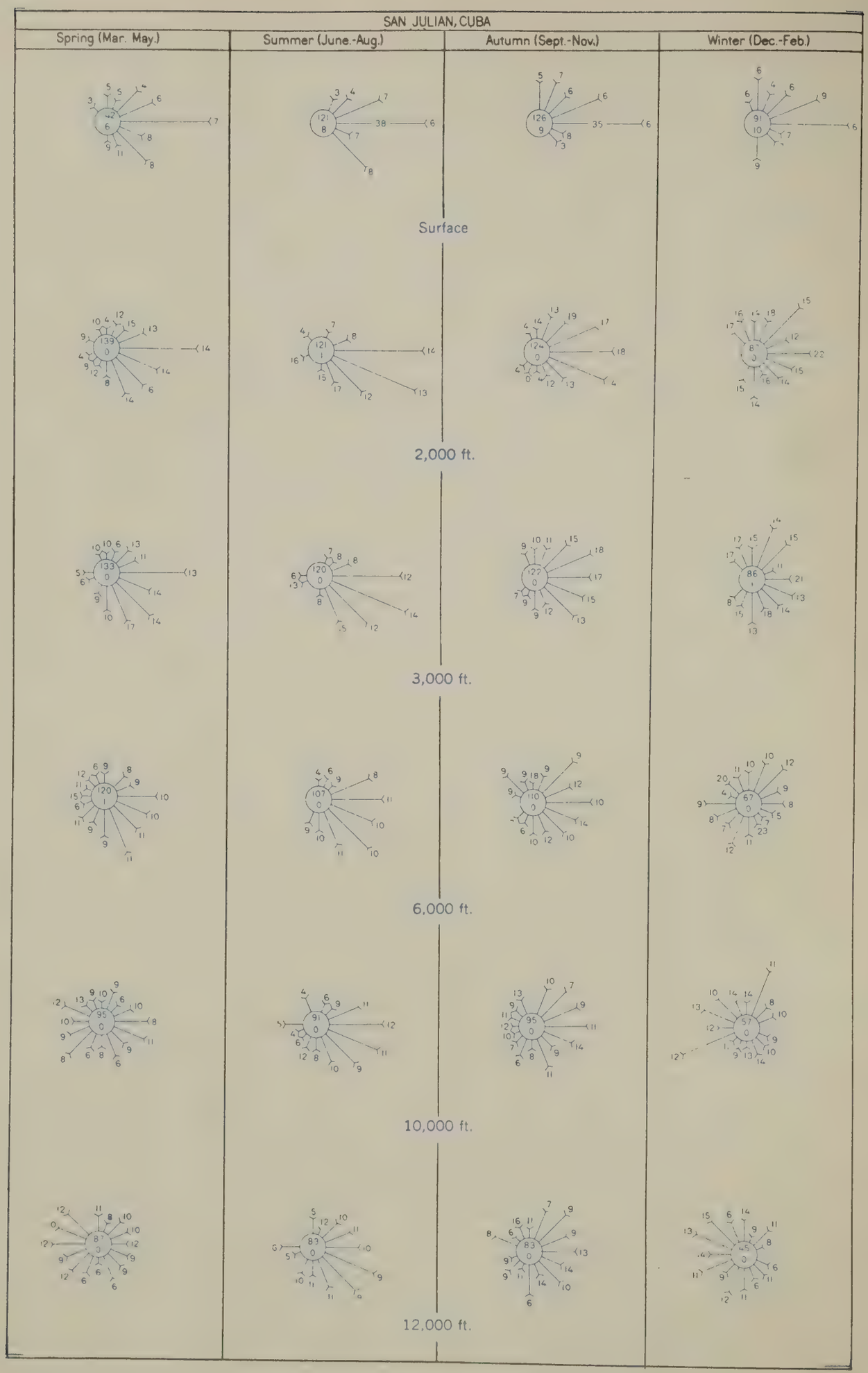
SCALE OF WIND PERCENTAGES

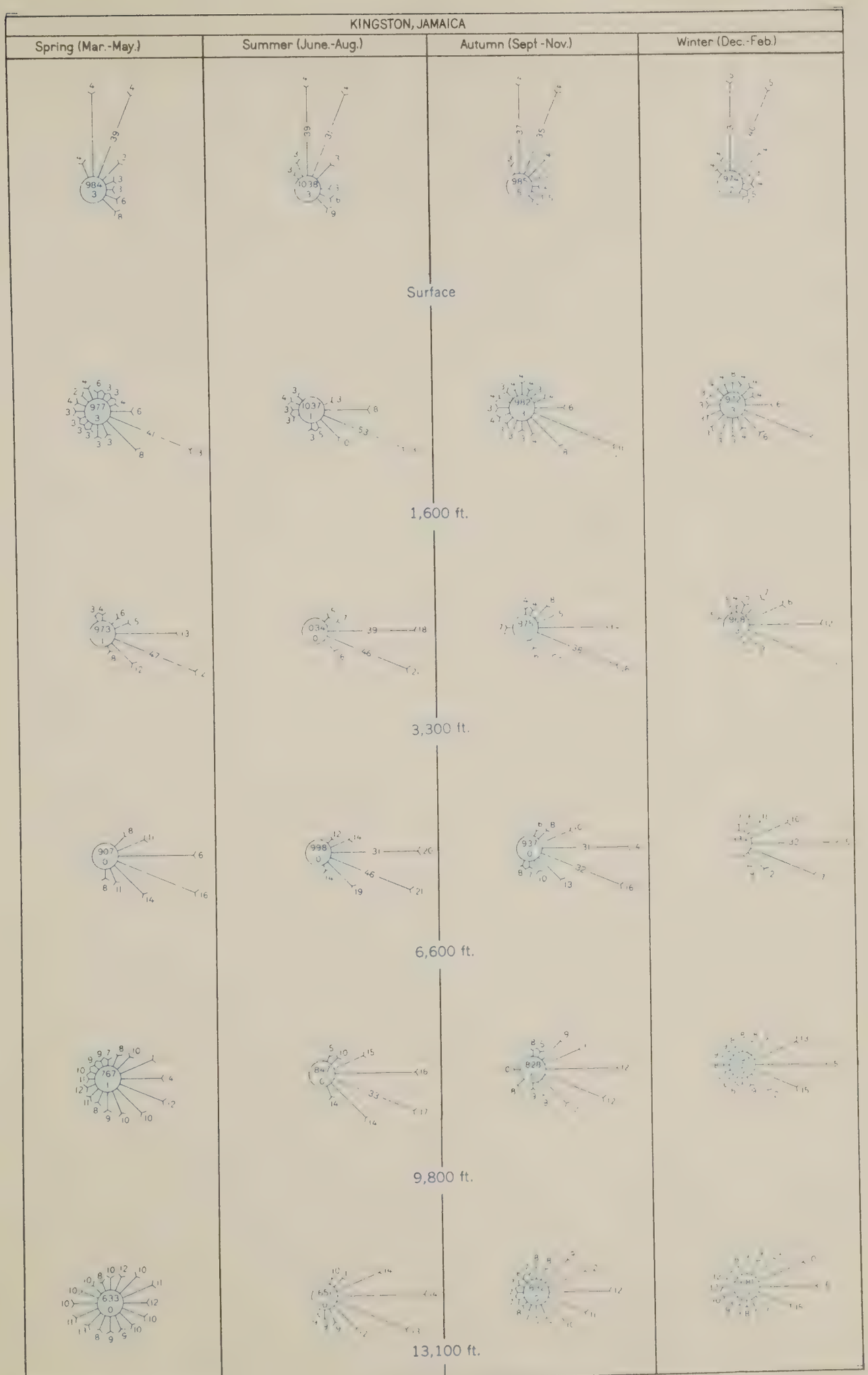
KEY WEST, FLORIDA

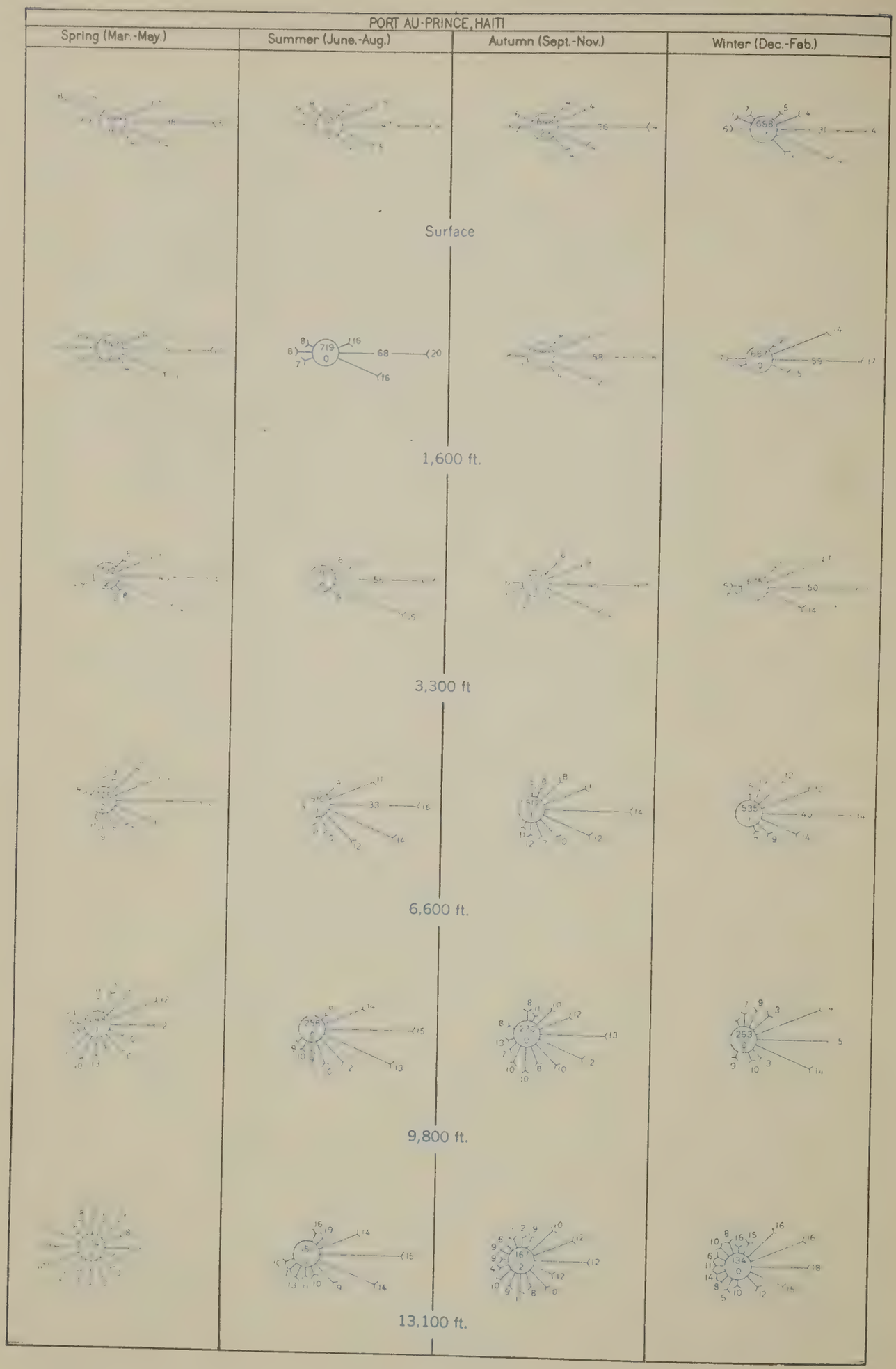
Spring (Mar.-May.)	Summer (June.-Aug.)	Autumn (Sept.-Nov.)	Winter (Dec.-Feb.)
			
Surface			
			
1,600 ft.			
			
3,300 ft.			
			
6,600 ft.			
			
9,800 ft.			
			
13,100 ft.			


MIAMI, FLORIDA
Spring (Mar.-May)
Summer (June Aug.)
Autumn (Sept.-Nov.)
Winter (Dec.-Feb.)
Surface
1,600 ft.
3,300 ft.
6,600 ft.
9,800 ft.
13,100 ft.

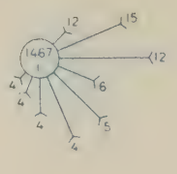
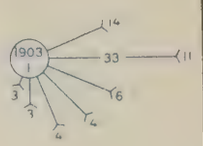
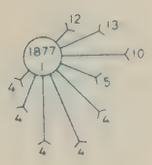
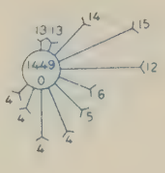
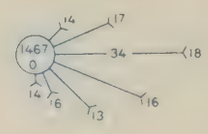
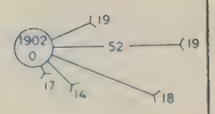
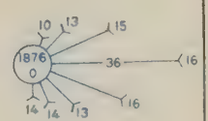
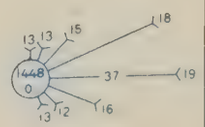
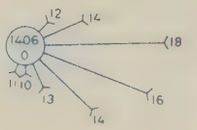
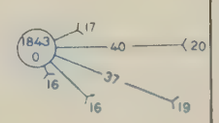
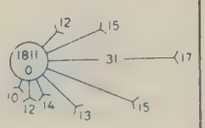
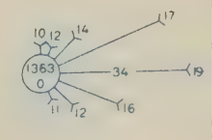
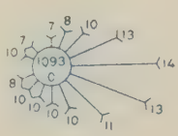
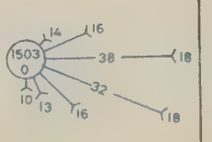
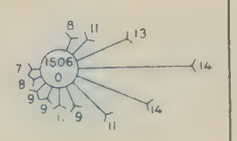
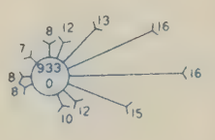
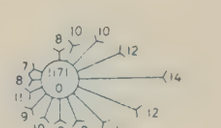
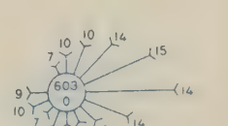
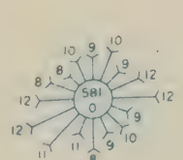
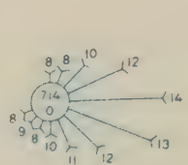
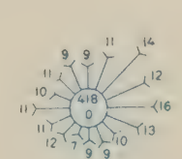

NUEVITAS, CUBA
Spring (Mar. May.)
Summer (June.-Aug.)
Autumn (Sept.-Nov.)
Winter (Dec. Feb.)
Surface
2,000 ft.
3,000 ft
6,000 ft.
10,000 ft.
12,000 ft.


SAN JULIAN, CUBA
Spring (Mar. May.)
Summer (June.-Aug.)
Autumn (Sept.-Nov.)
Winter (Dec.-Feb.)
Surface
2,000 ft.
3,000 ft.
6,000 ft.
10,000 ft.
12,000 ft.

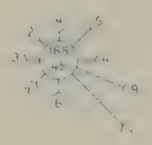
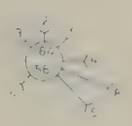
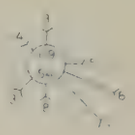
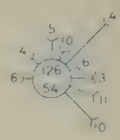
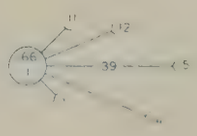
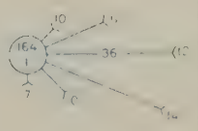
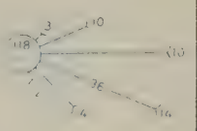
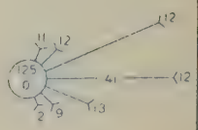
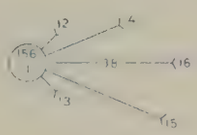
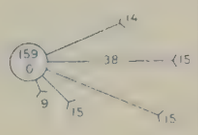
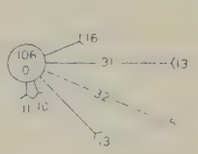
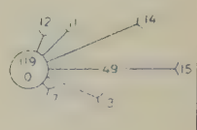
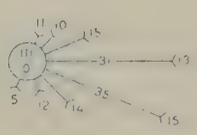
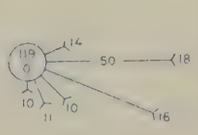
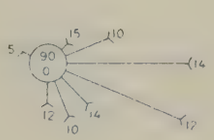
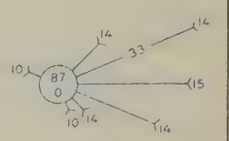
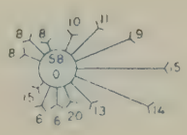
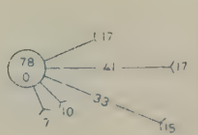
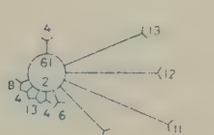
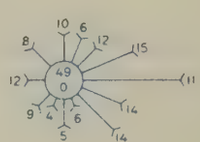
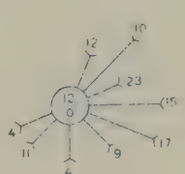
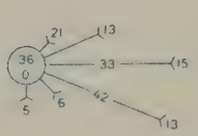
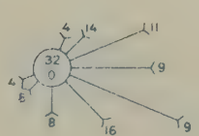
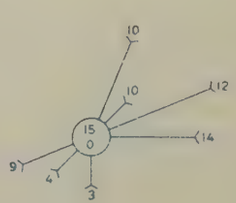

KINGSTON, JAMAICA
Spring (Mar.-May.)
Summer (June.-Aug.)
Autumn (Sept.-Nov.)
Winter (Dec.-Feb.)
Surface
1,600 ft.
3,300 ft.
6,600 ft.
9,800 ft.
13,100 ft.


PORT AU-PRINCE, HAITI
Spring (Mar.-May.)
Summer (June.-Aug.)
Autumn (Sept.-Nov.)
Winter (Dec.-Feb.)
Surface
1,600 ft.
3,300 ft
6,600 ft.
9,800 ft.
13,100 ft.

SAN JUAN, PUERTO RICO

Spring (Mar.-May.)	Summer (June.-Aug.)	Autumn (Sept.-Nov.)	Winter (Dec.-Feb.)
			
Surface			
			
1,600 ft.			
			
3,300 ft.			
			
6,600 ft.			
			
9,800 ft.			
			
13,100 ft.			

PORT-OF-SPAIN, TRINIDAD

Spring (Mar.-May.)	Summer (June.-Aug.)	Autumn (Sept.-Nov.)	Winter (Dec.-Feb.)
			
Surface			
			
2,000 ft.			
			
3,000 ft.			
			
6,000 ft.			
			
10,000 ft.			
			
12,000 ft.			


BARRANQUILLA, COLOMBIA
Spring (Mar.-May.)
Summer (June.-Aug.)
Autumn (Sept.-Nov.)
Winter (Dec.-Feb.)
Surface
2,000 ft.
3,000 ft.
6,000 ft.
10,000 ft.
12,000 ft.

Resultant winds.—Resultant winds are shown in table 3. In computing these data, each individual wind observation is considered as a vector quantity and all the observations involved are combined by adding these vectors to obtain the final value or vector which is recorded as the resultant wind. Resultant winds, therefore, when based on a sufficient number of frequent observations, represent the mass movement of the atmosphere for the area and level involved.

TABLE 3.—*Resultant winds*

[Directions in degrees from North (N.=360°, E.=90°, S.=180°, etc.). Velocities in knots

WINTER

Station	Surface		1,600 feet		3,300 feet		6,600 feet		9,800 feet		13,100 feet	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
Miami, Fla	84	2.1	102	4.9	124	2.7	267	4.7	273	9.9	267	14.8
Key West, Fla	66	4.3	93	7.9	118	5.8	216	2.3	259	5.6	263	9.9
Kingston, Jamaica	19	3.8	114	3.3	98	9.0	97	10.9	92	8.6	84	6.7
Port-au-Prince, Haiti	92	1.7	87	12.8	87	11.4	85	10.5	85	9.9	76	9.1
San Juan, Puerto Rico	81	6.7	83	14.6	85	14.0	83	10.8	79	7.4	58	3.6
	Surface		2,000 feet		3,000 feet		6,000 feet		10,000 feet		12,000 feet	
San Julian, Cuba	74	3.6	74	7.0	77	5.1	357	0.9	304	3.7	281	4.3
Nuevitas, Cuba	60	4.9	70	12.1	75	10.7	82	3.7	139	.9	246	2.6
Port-of-Spain, Trinidad	97	1.7	82	10.1	83	12.8	89	11.7	90	5.9	64	6.0
Barranquilla, Colombia	64	10.1	77	7.8	110	2.9	149	2.7	108	4.6	120	3.5

SPRING

	Surface		1,600 feet		3,300 feet		6,600 feet		9,800 feet		13,100 feet	
Miami, Fla	104	3.3	120	5.2	140	2.3	265	4.5	269	7.8	278	11.1
Key West, Fla	96	3.5	111	6.2	135	4.5	223	3.3	261	5.0	280	8.7
Kingston, Jamaica	27	3.1	116	6.3	108	12.0	105	10.5	108	5.5	102	10.4
Port-au-Prince, Haiti	72	1.6	93	9.7	94	9.1	89	6.8	103	4.3	215	1.2
San Juan, Puerto Rico	94	6.1	99	13.4	106	12.4	103	7.7	105	3.5	218	.8
	Surface		2,000 feet		3,000 feet		6,000 feet		10,000 feet		12,000 feet	
San Julian, Cuba	99	4.8	107	9.3	118	7.8	142	4.4	159	0.7	279	2.1
Nuevitas, Cuba	79	5.2	85	9.8	91	7.7	122	3.3	184	3.7	238	4.0
Port-au-Spain, Trinidad	121	2.4	91	12.1	94	13.6	100	11.7	98	7.8	90	8.0
Barranquilla, Colombia	68	7.4	78	4.2	146	2.5	169	2.4	137	3.8	123	6.0

SUMMER

	Surface		1,600 feet		3,300 feet		6,600 feet		9,800 feet		13,100 feet	
Miami, Fla	108	3.9	124	7.4	129	6.2	124	4.1	141	3.5	154	3.1
Key West, Fla	124	4.5	118	7.2	118	6.6	123	5.0	134	3.5	144	2.7
Kingston, Jamaica	25	2.9	112	8.5	103	17.0	106	18.5	105	13.3	99	10.5
Port-au-Prince, Haiti	86	3.1	93	15.6	95	15.1	101	11.4	104	10.7	97	9.5
San Juan, Puerto Rico	95	7.0	98	16.6	104	17.4	102	15.3	104	12.0	102	8.2
	Surface		2,000 feet		3,000 feet		6,000 feet		10,000 feet		12,000 feet	
San Julian, Cuba	94	4.8	113	10.2	117	9.7	119	7.0	112	6.1	116	5.2
Nuevitas, Cuba	89	6.0	89	11.9	91	11.6	105	8.1	125	6.4	135	4.6
Port-of-Spain, Trinidad	111	0.9	97	10.8	97	13.1	100	15.1	98	14.2	96	12.3
Barranquilla, Colombia	79	4.0	135	3.7	190	3.8	158	2.1	131	4.0	129	6.5

TABLE 3.—*Resultant winds*—Continued

AUTUMN

Station	Surface		1,600 feet		3,300 feet		6,600 feet		9,800 feet		13,100 feet	
	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity	Direction	Velocity
	Surface		1,600 feet		3,300 feet		6,600 feet		9,800 feet		13,100 feet	
Miami, Fla	64	4.7	76	9.3	78	8.0	69	3.1	338	1.0	292	2.7
Key West	67	4.9	76	9.9	86	8.2	93	3.9	95	1.2	272	1.2
Kingston, Jamaica	19	3.4	116	4.4	104	10.4	104	11.5	100	8.0	88	7.1
Port-au-Prince, Haiti	90	2.1	90	11.5	92	9.9	97	8.2	106	6.8	94	4.7
San Juan, Puerto Rico	105	4.2	97	12.0	100	11.8	100	8.9	104	6.1	112	3.3
	Surface		2,000 feet		3,000 feet		6,000 feet		10,000 feet		12,000 feet	
San Julian, Cuba	71	4.3	84	11.3	88	9.2	89	5.0	86	3.9	84	3.4
Nuevitas, Cuba	77	4.9	74	10.7	75	9.6	91	6.1	106	4.9	112	4.8
Port-of-Spain, Trinidad	130	2.0	106	10.6	107	12.2	107	10.2	101	9.1	101	8.0
Barranquilla, Colombia	112	1.9	154	2.8	177	2.9	191	3.2	126	3.5	145	5.0

It will be noted that in general, the directions and velocities of the resultant winds agree closely with those of the prevailing winds as shown in the wind roses. The resultant directions are from the east or east-northeast at all stations during the winter season and east or east-southeast during the other seasons, except near and above the "reversal" level or in the lower levels where affected by topography, land and sea breezes. At Barranquilla, Colombia, however, the resultant winds are from the southeast quadrant during all seasons and at all levels except during the winter and spring at the surface and 2,000 feet, when they are from the east-northeast. At 3,000 feet during summer and at 6,000 feet during autumn, moreover, the resultant winds are from directions somewhat west of south. The decrease in wind velocity at the reversal level is brought out especially well by the resultant data. Examples thereof may be noted at San Julian, Cuba, at 6,000 feet during the winter season and at 10,000 feet during the spring season.

Velocity frequencies.—In table 4, the percentage frequency of the occurrence of different wind velocities and the average velocities for each direction and level are shown for each station by seasons. It will be noted that light winds of 3 knots or less occur most frequently near the surface at all stations, except at Key West where there is little variation in frequency between the different levels and where such light velocities are on the whole, rather infrequent. At Port-of-Spain, Trinidad, the frequency of surface winds of 3 knots or less for the four seasons amounts to between 61 and 74 percent. Wind velocities falling in the next group (4–14 knots) are in general more frequently recorded at all stations than are the velocities falling in any of the other groups. Such velocities are usually more frequent

near the surface and above 10,000 feet and somewhat less frequent at the intermediate levels. Winds in the next velocity group (15–28 knots) occur most frequently at levels between 1,500 and 6,000 feet. Velocities of 29 to 41 knots are recorded rather infrequently; usually on less than 5 percent of the observations during all seasons and at all levels. In the last group (over 41 knots) the frequency of occurrence is less than 2 percent at all stations and all levels except at Miami where, during the winter season at 13,000 feet (where the "antitrades" are predominant) it amounts to 4 percent.

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*

KEY WEST, FLA.

WINTER (DECEMBER–FEBRUARY)

	Surface (36 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	8.0	0 9			8.9	9.1	2.6	3.0	0.1		5.7	15.5	1.9	1.1	0.1		3.1	12.6
NNE	9.8	.4			10.2	8.6	2.8	2.7	.1		5.6	15.1	1.4	1.1			2.5	12.8
NE	15.3	.4			15.7	8.2	2.2	2.6	.3		5.1	15.8	2.2	1.1			3.3	11.7
ENE	8.7	1.0			9.7	9.0	3.4	5.0	1.2		9.6	18.5	3.1	2.5	.3		5.9	14.5
E	10.0	1.6			11.6	9.8	5.0	11.6	1.9		18.5	18.9	5.3	8.2	.8		14.3	17.2
ESE	10.8	1.0			11.8	9.8	4.7	9.2	.5		14.4	17.9	6.0	11.0	.5		17.5	16.6
SE	7.6	.2			7.8	8.6	4.5	5.6	.2		10.3	15.6	6.6	5.4	.2		12.2	14.1
SSE	5.1	.1			5.2	8.3	3.2	2.9	.2		6.3	14.8	3.7	2.8	.1		6.6	13.9
S	3.3	.2			3.5	7.7	2.1	2.0	.1		4.2	14.4	2.8	2.1	.2		5.1	14.1
SSW	1.9	.3			2.2	8.3	1.5	1.4	.4		3.3	16.5	2.6	1.8	.2	0.1	4.7	14.4
SW	1.3				1.3	8.2	1.4	1.0	.1		2.5	15.1	1.7	1.6	.3		3.6	15.3
WSW	.8	.1			0.9	10.0	1.0	.7	.1		1.8	15.1	1.9	1.3	.1		3.3	14.0
W	.9	.3			1.2	9.5	1.2	.5	.1		1.8	13.0	1.8	1.4	.2		3.4	13.4
WNW	.6	.5			1.1	11.8	1.7	.6	.3		2.6	14.8	2.7	1.9	.2		4.8	14.3
NW	1.8	.8			2.6	11.3	1.4	1.4	.2		3.0	15.7	1.7	1.9	.2		3.8	15.6
NNW	3.1	1.1	0.1		4.3	12.4	2.1	2.3	.2		4.6	15.7	2.1	1.7	.1		3.9	13.8
Total, percent	89.0	8.9	.1		98.0	9.1	40.8	52.5	6.0		99.3	16.6	47.5	46.9	3.5	.1	98.0	14.9
	Percent 0–3 knots 2.0 Number of observations 3,245						Percent 0–3 knots 0.7 Number of observations 3,212						Percent 0–3 knots 2.0 Number of observations 3,035					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

KEY WEST, FLA.—Continued

WINTER (DECEMBER-FEBRUARY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	3.0	0.9			3.9	9.8	2.6	0.8	0.1		3.5	11.2	2.0	0.5	0.2		2.7	13.4
NNE	2.6	.8			3.4	10.2	2.0	.8			2.8	12.1	1.4	.7			2.1	11.0
NE	3.1	.8			3.9	9.8	2.0	.7			2.7	10.0	1.8	.3			2.1	9.3
ENE	4.2	1.0			5.2	10.1	2.5	.6			3.1	9.9	1.5	.2			1.7	7.7
E	4.8	2.4			7.2	12.0	3.7	.9			4.6	10.0	.8	.5			1.3	10.0
ESE	4.5	2.7	0.1		7.3	12.6	2.8	.9	.1		3.8	12.1	1.3	.2			1.5	9.1
SE	5.3	2.7			8.0	12.2	4.0	.9			4.9	9.8	1.7	.5			2.2	10.5
SSE	4.5	1.5			6.0	11.6	3.3	1.3	.1		4.7	10.9	2.2	.4			2.6	10.2
S	3.7	1.8	.3		5.8	13.2	3.6	1.2			4.8	11.6	2.9	1.1	.2		4.2	12.4
SSW	3.8	2.4	.4		6.6	13.6	4.2	2.3	.1		6.6	11.8	3.4	2.7	.2		6.3	14.8
SW	3.9	2.9	.2		7.0	14.2	5.1	3.6	.5		9.2	14.5	5.3	5.3	.8		11.4	15.8
WSW	3.7	2.8	.4	0.1	7.0	15.3	5.0	4.8	1.0		10.8	16.1	6.7	6.7	2.3	.2	15.9	15.9
W	4.5	3.4	.7		8.6	15.0	5.7	6.9	.9	0.1	13.6	16.6	6.3	8.5	2.2	.2	17.2	18.3
WNW	3.8	2.9	.5		7.2	14.4	6.0	4.7	.8	.2	11.7	15.4	6.2	6.7	1.1		14.0	16.9
NW	3.4	1.7	.2		5.3	12.3	3.2	2.7	.1		6.0	14.1	4.1	3.0	.5		7.6	14.7
NNW	3.7	.7			4.4	10.2	2.5	1.5			4.0	11.8	2.4	2.3	.1		4.8	13.9
Total, percent	62.5	31.4	2.8	.1	96.8	12.6	57.9	34.9	3.7	.3	96.8	13.4	50.0	39.6	7.6	.4	97.6	15.3
	Percent 0–3 knots 3.2 Number of observations 2,414						Percent 0–3 knots 3.2 Number of observations 1,819						Percent 0–3 knots 2.4 Number of observations 1,256					

SPRING (MARCH-MAY)

	Surface (36 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	6.1	0.5			6.6	8.3	2.7	1.2	0.1		4.0	12.1	2.0	0.6	0.1		2.7	10.4
NNE	4.0	.2			4.2	7.7	2.0	1.2	.1		3.3	12.5	1.9	.3			2.2	8.7
NE	5.0	.1			5.1	8.1	2.7	1.1			3.8	11.2	2.7	.7			3.4	10.5
ENE	5.7	.5			6.2	8.6	4.2	2.3	.3		6.8	13.1	4.6	2.7			7.3	12.7
E	10.8	2.6			13.4	10.6	6.6	8.6	.7	0.1	16.0	16.6	7.0	4.9	.3		12.2	13.7
ESE	13.1	2.2			15.3	10.7	6.3	8.9	.9		16.1	16.4	6.7	7.9	.5		15.1	15.3
SE	12.1	.8			12.9	9.1	5.1	5.8	.3		11.2	15.5	5.8	4.0	.2		10.0	14.0
SSE	5.3	.2			5.5	8.2	3.2	2.6	.1		5.9	14.0	4.3	1.7	.1		6.1	11.8
S	4.5	.3			4.8	7.7	3.0	1.9	.4		5.3	14.5	3.5	1.8	.3		5.6	12.8
SSW	2.5	.2			2.7	8.1	2.4	1.5	.4		4.3	14.6	3.0	2.2	.7	0.2	6.1	16.4
SW	2.8	.4			3.2	8.1	1.9	1.2	.3	.1	3.5	14.9	2.8	2.3	.4	.1	5.6	14.6
WSW	1.8	.3			2.1	9.3	1.6	.7	.1		2.4	11.8	2.9	1.5	.1	.1	4.6	13.1
W	1.2	.3			1.5	9.5	1.6	.8	.2		2.6	13.2	2.7	1.2	.3		4.2	13.5
WNW	1.6	.3			1.9	10.1	2.1	.9			3.0	12.0	2.9	1.5	.2		4.6	13.2
NW	4.3	1.0	0.1		5.4	9.9	3.3	1.4	.2		4.9	13.0	2.8	1.4	.1		4.3	12.0
NNW	4.3	1.2			5.5	10.3	2.6	1.4	.2		4.2	13.3	1.9	.7			2.6	10.8
Total, percent	85.1	11.1	.1		96.3	9.2	51.3	41.5	4.3	.2	97.3	14.5	57.5	35.4	3.3	.4	96.6	13.3
Percent 0–3 knots						3.7						2.7						3.4
Number of observations						3,261						3,244						3,044

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

KEY WEST, FLA.—Continued

SPRING (MARCH-MAY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	2.3	0.4			2.7	8.9	3.1	0.4			3.5	8.8	2.7	1.5	0.1		4.3	12.1
NNE	3.0	.3	0.1		3.4	9.0	2.6	.4	0.1		3.1	9.9	2.4	.4	.1		2.9	10.3
NE	3.7	.9			4.6	10.2	3.0	.8			3.8	10.4	2.2	.9			3.1	11.2
ENE	4.2	1.1			5.3	10.8	2.9	1.1			4.0	10.6	1.8	.4			2.2	10.1
E	4.6	2.4	.2		7.2	12.6	3.0	1.0	.1		4.1	10.4	2.3	.3			2.6	9.0
ESE	4.2	1.4	.2		5.8	11.5	2.8	.6	.2		3.6	10.8	1.5	.2			1.7	7.8
SE	4.1	.7	.1		4.9	10.0	3.1	1.2			4.3	11.0	1.6	.1			1.7	8.1
SSE	3.5	.9			4.4	10.6	2.4	.8			3.2	10.2	2.1	.4			2.5	9.4
S	4.5	2.3	.2		7.0	12.8	3.2	1.2			4.4	11.2	1.6	.3			1.9	10.5
SSW	4.2	2.9	.4		7.5	14.4	3.5	2.1	.1		5.7	13.1	3.2	1.0	.1		4.3	11.7
SW	5.9	3.5	.4	0.1	9.9	13.7	5.8	4.0	.3		10.1	13.4	4.4	3.0	.4		7.8	14.2
WSW	5.4	3.6	.7	.1	9.8	14.7	6.0	4.7	.7		11.4	14.9	5.8	5.3	1.2	0.1	12.4	16.3
W	4.8	4.2	.4		9.4	14.4	6.2	5.1	1.0	0.1	12.4	15.8	8.0	7.1	2.0	.3	17.4	17.3
WNW	3.8	1.9	.2		5.9	13.0	4.7	5.1	.4	0.1	10.3	14.8	6.9	6.5	1.5	.2	15.1	16.9
NW	3.9	1.2	.2		5.3	10.8	5.0	2.2	.2		7.4	12.3	5.3	3.8	.1		10.2	15.6
NNW	3.0	.4			3.4	9.1	3.5	1.3			4.8	11.1	3.8	2.4	.2	.1	6.5	13.2
Total, percent	65.1	28.1	3.1	.2	96.5	12.3	60.8	32.0	3.1	.2	96.1	12.7	55.6	33.6	6.7	.7	96.6	14.3
	Percent of 0–3 knots 3.5 Number of observations 2,485						Percent of 0–3 knots 3.9 Number of observations 1,913						Percent of 0–3 knots 3.4 Number of observations 1,379					

Summer (June–August)

	Surface (36 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	1.9	0.1			2.0	6.4	1.5	0.2			1.7	7.5	1.4		0.1		1.5	7.0
NNE	1.2				1.2	5.8	1.2	.1	0.1		1.4	8.4	1.6	0.1			1.7	7.0
NE	2.7				2.7	6.4	2.6	.2			2.8	8.0	3.4	.3			3.7	8.5
ENE	5.2	.1			5.3	6.5	4.7	1.4			6.1	10.6	6.9	1.6			8.5	10.1
E	13.0	.6			13.6	8.2	11.3	6.6	.1		18.0	12.6	12.3	4.2	.2		16.7	11.6
ESE	20.4	1.0			21.4	8.5	13.2	8.6	.2		22.0	13.3	12.9	7.6	.2		20.7	12.8
SE	16.2	.3			16.5	7.8	11.1	4.3			15.4	11.6	9.5	3.7	.2		13.4	11.4
SSE	8.5	.2			8.7	7.2	5.8	.9	.1		6.8	10.0	4.9	1.1			6.0	10.1
S	5.7	.3			6.0	6.8	3.7	.9	.2		4.8	11.0	3.3	1.0	.3		4.6	11.0
SSW	3.0	.1			3.1	6.8	2.5	.8	.1		3.4	10.3	2.7	1.0	.1		3.8	12.6
SW	3.2	.3			3.5	7.1	2.5	.3	.1		2.9	9.6	3.0	.7			3.7	9.7
WSW	2.5	.2			2.7	7.2	2.4	.3			2.7	8.4	2.2	.5			2.7	8.9
W	2.1				2.1	7.0	2.4	.1			2.5	7.0	2.0	.2			2.2	8.2
WNW	1.2	.1			1.3	6.9	1.5	.1			1.6	7.6	1.8	.1			1.9	7.1
NW	2.8	.1			2.9	7.0	1.8	.2			2.0	8.2	1.3	.2			1.5	7.2
NNW	1.3				1.3	6.6	1.3				1.3	7.1	.8	.1			.9	5.8
Total, percent	90.9	3.4			94.3	7.5	69.5	25.0	.9		95.4	11.1	70.0	22.4	1.1		93.5	10.7
Percent 0–3 knots						5.7						4.6						6.5
Number of observations						3,408						3,392						3,187

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

KEY WEST, FLA.—Continued

SUMMER (JUNE–AUGUST)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	1.1	0.1	0.1		1.3	7.9	1.8	0.2			2.0	8.0	1.7	0.2			1.9	7.1
NNE	1.7	.2			1.9	7.8	1.8	.3			2.1	7.1	2.5	.2			2.7	6.8
NE	3.3	.7			4.0	9.2	3.4	.8			4.2	9.1	4.2	.5			4.7	8.3
ENE	6.5	1.9	.1		8.5	11.0	5.9	1.3			7.2	9.4	6.1	.7			6.8	9.2
E	12.7	4.3	.1		17.1	11.5	12.3	3.5			15.8	10.8	12.0	2.0			14.0	10.3
ESE	10.7	4.0	.1		14.8	11.5	9.7	2.2			11.9	10.2	7.4	1.6			9.0	10.3
SE	7.7	2.1	.1		9.9	10.4	6.6	1.2			7.8	9.4	7.7	.8			8.5	8.6
SSE	5.2	1.1			6.3	10.0	5.3	.9			6.2	9.1	5.1	.8			5.9	8.3
S	4.9	1.3	.1		6.3	9.7	5.7	1.3			7.0	9.6	4.9	.9	0.1		5.9	9.2
SSW	4.5	1.3	.1		5.9	10.1	5.7	1.6	0.1		7.4	10.5	5.1	1.7	.1		6.9	9.5
SW	3.6	1.4			5.0	10.4	4.5	1.6			6.1	10.9	5.4	2.0			7.4	10.1
WSW	3.8	.7			4.5	9.1	4.0	.9			4.9	10.1	4.8	1.8			6.6	10.7
W	2.4	.2			2.6	8.0	4.6	.4			5.0	8.2	4.4	.5			4.9	8.6
WNW	2.6	.2			2.8	8.1	2.3	.5			2.8	8.2	2.4	1.0			3.4	10.2
NW	1.3	.1			1.4	7.3	1.9	.4			2.3	8.4	2.1	.3			2.4	8.5
NNW	1.0				1.0	5.8	1.4				1.4	6.9	2.0	.1	.1		2.2	7.2
Total, percent	73.0	19.6	.7		93.3	10.2	76.9	17.1	.1		94.1	9.7	77.8	15.1	.3		93.2	9.3
Percent 0–3 knots	6.7						5.9						6.8					
Number of observations	2,727						2,203						1,697					

Autumn (September-November)

	Surface (36 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	6.1	0.7			6.8	9.2	2.6	2.7	0.1		5.4	15.2	1.7	0.9	0.1		2.7	12.8
NNE	7.5	.5			8.0	9.0	2.5	2.8	.3		5.6	15.4	2.2	1.3			3.5	12.5
NE	15.2	.6			15.8	8.8	3.0	5.3	.9		9.2	18.4	3.9	3.0	.4		7.3	15.3
ENE	12.3	1.5			13.8	9.1	5.1	9.9	2.5	0.1	17.6	19.3	5.6	7.5	1.3	0.1	14.5	16.9
E	13.9	1.6			15.5	9.3	7.4	11.2	1.2		19.8	17.3	8.6	11.1	1.2		20.9	16.5
ESE	10.6	.6			11.2	8.7	7.4	6.4	.1		13.9	14.2	8.0	6.5	.2		14.7	14.2
SE	6.6	.2			6.8	7.6	4.6	2.2			6.8	12.6	5.4	2.5	.1		8.0	12.2
SSE	2.8	.2			3.0	7.3	2.2	.6	.1		2.9	11.6	3.2	.7	.1		4.0	10.6
S	2.6	.1			2.7	7.0	1.8	.7	.1		2.6	11.8	1.7	.7	.1		2.5	10.3
SSW	1.5	.1			1.6	7.9	1.7	.4	.1		2.2	11.3	1.5	.6	.1		2.2	11.4
SW	1.9	.1	0.1		2.1	8.0	1.2	.3	.1	.1	1.7	12.9	1.7	.7	.1		2.5	12.2
WSW	1.0	.1			1.1	7.2	1.1	.3			1.4	10.5	1.9	.5			2.4	10.5
W	1.4	.2			1.6	7.8	1.4	.3			1.7	9.8	1.6	.5			2.1	11.0
WNW	1.1	.3			1.4	9.7	1.1	.4	.1		1.6	12.3	1.7	.6			2.3	10.9
NW	2.2	.6			2.8	10.0	1.7	.8	.1		2.6	12.7	2.1	1.1	.1		3.3	12.5
NNW	2.3	.6			2.9	10.0	1.7	1.3	.2		3.2	14.7	1.9	1.3	.1		3.3	12.5
Total, percent	89.0	8.0	1		97.1	8.8	46.5	45.6	5.9	.2	98.2	15.7	52.7	39.5	3.9	.1	96.2	14.1
Percent 0–3 knots	2.9						1.8						3.8					
Number of observations	3,485						3,473						3,265					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

KEY WEST, FLA.—Continued

AUTUMN (SEPTEMBER-NOVEMBER)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total per cent	Average velocity
N	3.1	0.7			3.8	9.4	3.1	1.1			4.2	10.2	3.6	0.9	0.1		4.6	9.9
NNE	3.5	1.2			4.7	10.8	4.3	.6	0.1		5.0	9.3	3.3	.8			4.1	9.9
NE	5.2	2.0	0.2		7.4	12.1	5.1	1.0	.2		6.3	10.1	3.9	.9			4.8	9.8
ENE	6.9	4.5	.3		11.7	13.6	7.2	2.3	.1		9.6	11.3	5.0	2.5			7.5	11.9
E	8.4	5.2	.2		13.8	13.0	7.0	3.1	.1		10.2	11.8	6.1	2.3			8.4	11.1
ESE	7.8	3.3			11.1	12.0	6.7	1.4			8.1	10.5	3.9	1.4	.1		5.4	11.3
SE	5.7	1.4			7.1	10.4	5.1	1.7			6.8	10.3	3.3	1.0			4.3	9.6
SSE	3.7	.5			4.2	8.9	3.1	.3			3.4	7.7	3.2	.4			3.6	8.9
S	2.8	.9			3.7	9.8	3.5	.6	.1		4.2	8.4	4.0	.4	.1		4.5	8.3
SSW	2.9	1.0	.1		4.0	10.9	4.4	1.2	.1		5.7	10.2	4.1	1.7	.1		5.9	10.4
SW	4.0	1.6	.1		5.7	11.8	4.3	1.8	.1		6.2	11.8	5.3	1.7	.1		7.1	11.0
WSW	3.1	1.0	.1		4.2	11.3	4.8	1.2	.2		6.2	11.2	5.7	2.5	.1		8.3	12.3
W	2.7	1.1	.1		3.9	11.8	4.3	1.6	.3		6.2	11.8	5.8	3.1	.1		9.0	12.4
WNW	2.4	1.0			3.4	10.1	3.7	1.3	.1		5.1	11.6	5.1	2.3	.2		7.6	11.9
NW	2.7	.5	.2		3.4	10.3	3.2	.7			3.9	9.0	4.2	1.8	.1		6.1	11.1
NNW	2.2	.6			2.8	9.8	3.2	1.1			4.3	10.5	3.5	.7	.1		4.3	10.5
Total, percent	67.1	26.5	1.3		94.9	11.5	73.0	21.0	1.4		95.4	10.6	70.0	24.4	1.1		95.5	10.9
	Percent 0–3 knots 5.1 Number of observations 2,694						Percent 0–3 knots 4.6 Number of observations 2,061						Percent 0–3 knots 4.5 Number of observations 1,422					

MIAMI, FLA.

SPRING (MARCH–MAY)

	Surface (33 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	4.2	0.1			4.3	5.1	1.3	0.7	0.1		2.1	14.4	2.2	0.5			2.7	10.3
NNE	2.1				2.1	5.2	1.2	.6	.1		1.9	11.6	2.2	.3	0.1		2.6	10.5
NE	4.6	.4			5.0	8.7	2.7	2.2	.1		5.0	13.5	3.2	2.0	.1		5.3	12.5
ENE	8.1	1.9			10.0	10.3	5.0	4.6	.2		9.8	15.1	4.3	3.7			8.0	13.3
E	10.7	1.8			12.5	9.7	6.8	6.5	.5		13.8	15.3	6.8	4.3	.4		11.5	13.7
ESE	9.9	1.1			11.0	9.3	6.9	5.5	.4		12.8	15.0	6.4	4.3	.1		10.8	13.0
SE	8.5	.9			9.4	8.4	5.6	4.9	.2		10.7	14.4	4.6	3.2			7.8	13.4
SSE	8.9	.3			9.2	9.2	4.8	3.2	.2		8.2	14.0	4.5	2.2	.1		6.8	12.8
S	4.1	.2			4.3	7.6	3.9	3.4	.5		7.8	14.8	3.2	1.5	.2		4.9	12.5
SSW	1.7	.1			1.8	7.3	2.8	1.6	.1		4.5	12.9	4.0	1.3	.4		5.7	12.4
SW	2.1	.3			2.4	7.3	1.5	1.1	.1	0.1	2.8	12.6	3.7	1.9	.2	0.1	5.9	13.2
WSW	2.1	.5			2.6	9.2	1.3	2.1	.2		3.6	16.2	2.6	1.7	.4		4.7	13.6
W	3.1	.6			3.7	8.5	1.6	2.0	.6		4.2	17.4	4.4	3.2	.8	.1	8.5	16.2
WNW	1.9	.2			2.1	7.8	2.3	1.5	.3		4.1	13.7	2.9	1.7	.6	.1	5.3	15.2
NW	3.6	.1			3.7	6.2	1.6	1.6	.3		3.5	15.0	2.3	1.2	.3		3.8	14.2
NNW	4.1	.2			4.3	6.2	1.6	1.1	.1		2.8	13.8	1.9	.7	.1		2.7	11.3
Total, percent	79.7	8.7			88.4	8.2	50.9	42.6	4.0	.1	97.6	14.6	59.2	33.7	3.8	.3	97.0	13.3
Percent 0–3 knots						11.6						2.4						3.0
Number of observations						1,549						1,548						1,461

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

MIAMI, FLA.—Continued

SPRING (MARCH–MAY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	2.9	0.9			3.8	10.2	2.9	0.4			3.3	9.2	2.0	1.3	0.2		3.5	12.1
NNE	2.8	.4			3.2	9.8	2.1	.5			2.6	9.3	2.1	.3			2.4	8.7
NE	3.0	1.2			4.2	11.6	3.6	.2			3.8	7.4	1.9	.3			2.2	8.3
ENE	4.1	1.0			5.1	10.3	3.5	.9	0.1		4.5	10.9	1.7	.5			2.2	9.8
E	4.1	2.2			6.3	11.6	3.9	1.0	.1		5.0	9.8	1.6	.5			2.1	8.9
ESE	3.5	1.2	0.2		4.9	11.6	2.2	.9	.2		3.3	11.2	2.2				2.2	8.2
SE	4.2	.8	.1		5.1	9.9	1.9	.3			2.2	8.5	1.1	.3			1.4	9.9
SSE	2.9	.6			3.5	9.5	1.4	.6			2.0	10.1	.9	.5			1.4	10.0
S	2.3	.3			2.6	9.4	2.8	.7	.1		3.6	11.0	1.8	.3			2.1	8.2
SSW	2.8	1.4	.3	0.1	4.6	14.0	3.1	1.5	.1		4.7	12.6	2.0	.8			2.8	10.0
SW	4.5	3.0	.4	.1	8.0	14.7	4.3	2.1	.3	0.2	6.9	14.3	3.8	2.3	.8		6.9	14.4
WSW	4.5	4.5	.7	.3	10.0	16.7	4.9	5.2	2.7	.7	13.5	20.8	5.0	5.8	2.7	0.5	14.0	19.9
W	5.5	4.9	1.0	.6	12.0	17.5	5.2	7.3	2.2	.3	15.0	18.8	6.7	6.9	4.7	.8	19.1	20.8
WNW	5.8	4.1	.7	.3	10.9	15.2	4.4	6.8	1.7	.1	13.0	17.8	7.0	6.0	3.0	.3	16.3	17.9
NW	4.2	2.6	.3		7.1	12.5	4.5	2.2	.9	.1	7.7	14.0	5.2	4.5	.9	.2	10.8	16.5
NNW	3.3	.5	.1		3.9	9.4	3.3	1.0	.1		4.4	10.8	4.7	1.4	.3		6.4	12.0
Total, percent	60.4	29.6	3.8	1.4	95.2	13.2	54.0	31.6	8.5	1.4	95.5	14.5	49.7	31.7	12.6	1.8	95.8	15.9
Percent 0–3 knots	4.8						4.5						4.2					
Number of observations	1,187						950						637					

SUMMER (JUNE-AUGUST)

	Surface (33 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	3.5				3.5	3.7	1.0				1.0	6.8	0.8	0.1			0.9	8.1
NNE	2.1	0.1			2.2	4.4	.8	0.2	0.1		1.1	10.1	1.5	.1	0.1		1.7	8.6
NE	4.0	.4			4.4	6.3	1.7	1.0			2.7	12.3	3.0	.3			3.3	8.7
ENE	6.4	.3			6.7	7.4	4.3	2.5	.1		6.9	12.6	5.0	2.0			7.0	11.4
E	14.8	1.0			15.8	8.5	10.6	5.4			16.0	12.4	9.3	4.7	.1		14.1	12.3
ESE	13.8	1.0			14.8	8.5	13.1	6.6	.3		20.0	12.9	12.7	4.4	.1		17.2	11.9
SE	9.0	.4			9.4	7.8	11.0	4.4	.1		15.5	12.0	10.5	3.3			13.8	11.6
SSE	7.0	.1			7.1	7.8	7.8	2.3	.3		10.4	12.0	7.4	2.5	.2	0.1	10.2	11.6
S	3.7	.1			3.8	6.6	5.0	1.5			6.5	11.0	4.2	1.1	.1		5.4	10.8
SSW	2.3	.1			2.4	5.1	3.7	.9	.1		4.7	11.1	3.8	1.1	.2		5.1	10.9
SW	2.1	.1			2.2	6.6	2.7	.7	.1		3.5	10.1	4.0	.9	.1		5.0	9.9
WSW	1.5				1.5	5.8	1.8	1.0			2.8	10.8	3.8	.8			4.6	10.8
W	1.2				1.2	6.5	1.7	.3			2.0	8.3	2.5	.3			2.8	8.8
WNW	1.3				1.3	6.3	1.4	.2			1.6	9.0	1.9	.1			2.0	7.4
NW	.8				.8	4.3	1.1	.1			1.2	6.4	.7	.1			.8	5.2
NNW	1.8	.1			1.9	4.8	.5	.3			.8	9.4	1.5				1.5	6.0
Total, percent	75.3	3.7			79.0	6.7	68.2	27.4	1.1		96.7	11.7	72.6	21.8	.9	.1	95.4	10.9
Percent 0–3 knots	21.0						3.3						4.6					
Number of observations	1,556						1,556						1,486					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

MIAMI, FLA.—Continued

SUMMER (JUNE-AUGUST)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	2.4	0.2			2.6	6.9	1.9	0.2			2.1	7.2	1.6	0.1			1.7	6.3
NNE	2.9	.1	0.1		3.1	7.9	3.3	.4	0.1		3.8	7.8	3.4	.1			3.5	6.7
NE	4.6	.6			5.2	8.2	4.1	.4			4.5	8.3	4.3	.6			4.9	8.6
ENE	7.1	2.1	.1		9.3	10.6	7.1	1.0			8.1	9.4	7.2	1.2			8.4	9.3
E	9.4	3.3	.2		12.9	11.4	7.5	3.5			11.0	11.1	10.2	1.5			11.7	9.8
ESE	10.2	2.9			13.1	10.5	10.1	2.2			12.3	10.1	8.2	1.4			9.6	8.9
SE	6.2	2.3			8.5	10.9	6.8	1.6			8.4	10.4	7.3	2.1			9.4	10.5
SSE	5.9	1.6			7.5	9.9	4.5	1.5	.1		6.1	10.1	4.9	1.0			5.9	9.9
S	4.8	1.1	.1		6.0	10.5	4.9	2.1			7.0	11.6	4.5	1.8			6.3	10.4
SSW	4.3	1.1	.2		5.6	10.7	4.3	2.3			6.6	11.6	6.5	1.9	0.1		8.5	10.4
SW	3.7	1.5	.1		5.3	11.0	5.2	1.9	.2		7.3	11.2	4.1	2.4	.1		6.6	12.7
WSW	3.4	.9			4.3	10.7	3.0	1.7			4.7	12.3	3.4	2.1	.3		5.8	13.6
W	3.4	.4			3.8	9.2	2.8	1.4			4.2	12.0	2.9	1.1	.2		4.2	12.1
WNW	1.9	.4			2.3	9.0	2.0	.4			2.4	8.5	1.8	1.3	.1		3.2	11.3
NW	1.8	.1			1.9	7.6	2.2	.5			2.7	8.8	1.3	.3			1.6	9.1
NNW	2.0	.2			2.2	6.1	1.3				1.3	5.7	1.8				1.8	6.6
Total, percent	74.0	18.8	.8		93.6	10.1	71.0	21.1	.4		92.5	10.1	73.4	18.9	.8		93.1	10.1
	Percent 0–3 knots					4.6	Percent 0–3 knots					7.5	Percent 0–3 knots					6.9
	Number of observations					1,303	Number of observations					1,122	Number of observations					875

Autumn (September–November)

	Surface (33 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	8.0	0.2			8.2	6.1	2.1	1.7	0.4		4.2	16.1	1.6	0.8	0.1		2.5	13.0
NNE	3.7	.2			3.9	6.4	2.1	2.6	.1		4.8	15.9	2.6	2.0	.3		4.9	13.6
NE	9.6	2.1			11.7	9.0	3.6	5.7	1.1	0.1	10.5	18.7	4.2	6.0	.4		10.6	16.5
ENE	12.1	4.0			16.1	10.4	5.5	11.1	1.3		17.9	18.3	6.9	9.7	1.1		17.7	16.3
E	11.6	2.6			14.2	9.1	7.5	10.0	1.1		18.6	16.5	7.0	11.1	.6	0.1	18.8	16.2
ESE	7.4	.6			8.0	8.4	6.9	4.7	.5	.2	12.3	14.5	6.4	4.1	.8		11.3	14.5
SE	4.2	.3			4.5	8.0	4.7	2.7	.1		7.5	12.6	3.9	2.0	.1		6.0	12.2
SSE	2.5	.1			2.6	10.0	2.9	1.1	.1		4.1	12.3	3.0	1.3	.1		4.4	11.9
S	2.0	.3			2.3	6.9	1.8	.6	.2		2.6	12.2	2.1	.5			2.6	9.0
SSW	1.2				1.2	5.6	1.6	.8			2.4	11.3	1.7	.6	.2	.1	2.6	13.7
SW	.5	.1			.6	5.2	.7	.2	.1		1.0	10.6	1.2	.6	.1		1.9	11.6
WSW	1.3				1.3	5.7	1.4	.4	.1	.1	2.0	11.9	1.2	.6	.1		1.9	11.2
W	1.5	.1			1.6	6.5	1.1	.6			1.7	13.0	2.4	1.1	.1		3.6	11.0
WNW	1.2	.1			1.3	6.5	1.8	.6	.1		2.5	12.2	1.4	.9	.2		2.5	15.1
NW	4.0	.2			4.2	6.9	1.8	1.0	.1		2.9	12.9	1.3	.9	.2	.1	2.5	15.1
NNW	6.2	.3			6.5	7.5	2.0	1.2	.2		3.4	13.6	1.9	.9	.1		2.9	12.7
Total, percent	77.0	11.2			88.2	8.1	47.5	45.0	5.5	.4	98.4	15.5	48.8	43.1	4.5	.3	96.7	14.5
Percent 0–3 knots						11.8						1.6						3.3
Number of observations						1,580						1,578						1,496

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

MIAMI, FLA.—Continued

AUTUMN (SEPTEMBER-NOVEMBER)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	2.8	1.8	0.1		4.7	12.7	2.8	1.1	0.3		4.2	12.0	2.5	1.2	0.3		4.0	12.8
NNE	3.2	1.2	.1		4.5	11.3	3.3	1.0	.1		4.4	11.2	3.5	1.3			4.8	12.5
NE	5.1	2.8	.1		8.0	12.3	4.7	1.8			6.5	11.1	5.7	.8			6.5	10.0
ENE	6.2	3.8	.2		10.2	13.3	5.3	2.6			7.9	11.4	5.7	1.8			7.5	10.0
E	9.8	4.8	.2		14.8	12.3	7.9	2.9			10.8	11.5	3.5	2.0			5.5	11.0
ESE	5.7	3.8	.1		9.6	13.4	5.3	1.7			7.0	10.8	4.0	1.2			5.2	9.6
SE	4.3	1.2	.1		5.6	10.4	5.1	.6			5.7	9.0	4.2	.5			4.7	9.2
SSE	2.5	.3	.1		2.9	9.9	3.4	.2			3.6	8.6	2.5	.5			3.0	10.1
S	3.1	.3			3.4	8.3	2.7	.3			3.0	8.7	2.9	.3			3.2	8.8
SSW	2.1	1.1	.3		3.5	12.8	2.9	.6	.1		3.6	9.2	3.7	.7			4.4	9.4
SW	2.3	1.2	.2		3.7	11.9	4.3	1.6	.2		6.1	12.1	4.2	.5	.3	0.2	5.2	11.6
WSW	3.3	1.7	.2		5.2	12.0	4.2	2.0	.8	0.1	7.1	14.1	7.2	2.2	.3		9.7	13.3
W	2.5	1.7	.3		4.5	14.2	3.8	2.0	.8	.1	6.7	14.4	6.9	3.9	1.3		12.1	14.3
WNW	4.1	.9	.3		5.3	11.4	3.7	2.4	.6	.1	6.8	14.4	3.4	3.4	.6		7.4	14.8
NW	4.2	.9	.2		5.3	10.5	4.1	2.4	.1		6.6	11.8	4.7	2.5	.2		7.4	12.0
NNW	3.4	1.4			4.8	11.1	3.7	1.3	.1		5.1	11.6	3.2	1.5			4.7	11.2
Total, percent	64.6	28.9	2.5		96.0	12.0	67.2	24.5	3.1	.3	95.1	11.6	67.8	24.3	3.0	.2	95.3	11.7
Percent 0–3 knots						4.0						4.9						4.7
Number of observations						1,189						899						597

Winter (December–February)

	Surface (33 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	8.2	0.3			8.5	7.0	2.3	2.5	0.2		5.0	15.6	2.7	1.4			4.1	11.5
NNE	2.2	.3			2.5	7.6	2.1	2.2	.2		4.5	15.3	1.6	.9			2.5	12.0
NE	4.9	.2			5.1	7.0	2.0	3.2	.1		5.3	16.2	3.4	1.7	0.1		5.2	12.9
ENE	6.0	1.1			7.1	8.9	5.2	3.8	.3		9.3	14.8	4.5	3.6	.1		8.2	14.1
E	9.5	1.4			10.9	8.6	4.4	5.9	.3		10.6	16.5	6.2	5.0	.3		11.5	14.6
ESE	9.8	1.1			10.9	8.3	6.8	7.2	.4		14.4	15.5	6.1	4.3	.3		10.7	14.2
SE	6.9	.8			7.7	8.8	5.6	4.9	.2		10.7	14.6	5.2	4.7			9.9	14.1
SSE	5.5	.5			6.0	8.3	4.1	3.5	.2		7.8	14.3	4.2	2.7	.1		7.0	12.9
S	4.7	.5			5.2	8.3	2.4	2.7	.4		5.5	16.1	2.7	1.5	.1		4.3	13.2
SSW	1.9	.1			2.0	8.1	2.0	1.8	.2		4.0	15.3	3.4	1.3	.3	0.1	5.1	13.3
SW	2.0	.5			2.5	8.4	1.9	1.1	.3		3.3	14.3	3.2	1.9		.1	5.2	13.6
WSW	1.7	.4			2.1	8.6	1.1	1.2	.5		2.8	17.2	2.1	2.0	.7		4.8	17.0
W	1.7				1.7	4.8	1.5	1.3	.2		3.0	13.1	2.3	1.8	.8		4.9	16.9
WNW	2.5	.4			2.9	8.0	1.9	.8	.4		3.1	15.6	2.5	2.4	.5		5.4	15.7
NW	5.5	.1			5.6	7.2	2.1	2.0	.3		4.4	16.0	2.8	1.3	.3		4.4	13.3
NNW	8.2	.4			8.6	8.1	1.9	2.5	.5		4.9	17.1	2.5	1.5	.2		4.2	12.3
Total, percent	81.2	8.1			89.3	7.8	47.3	46.6	4.7		98.6	15.4	55.4	38.0	3.8	.2	97.4	13.9
Percent 0–3 knots						10.7						1.4						2.6
Number of observations						1,627						1,626						1,535

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

MIAMI, FLA.—Continued

WINTER (DECEMBER–FEBRUARY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	2.8	1.2			4.0	10.7	1.6	1.5			3.1	14.6	1.3	0.9	0.5		2.7	16.9
NNE	2.2	.6	0.1		2.9	10.6	1.4	.6			2.0	11.7	1.1				1.1	9.1
NE	3.1	.5			3.6	10.4	2.2	.2			2.4	8.7	1.1	.2			1.3	10.2
ENE	3.4	.8	.1		4.3	10.7	2.0	.3			2.3	8.8	.2				.2	11.2
E	3.2	1.1			4.3	11.5	2.2	.3			2.5	8.8	.4	.2			.6	7.8
ESE	4.8	2.1			6.9	11.6	2.6	.6	0.1		3.3	10.5	.5	.2			.7	7.0
SE	3.1	1.7			4.8	12.5	2.2				2.2	8.4	2.7	.5			3.2	10.8
SSE	3.2	1.3			4.5	11.2	2.8	.2			3.0	8.8	.9	.2			1.1	10.3
S	3.9	.5	.1		4.5	9.6	2.8	.9	.1		3.8	11.8	2.3	.9			3.2	9.6
SSW	2.8	1.4	.3		4.5	12.4	2.7	1.5			4.2	13.3	1.8	2.1	.4		4.3	16.1
SW	4.4	2.2	.3	0.2	7.1	13.8	4.5	3.6	.2	0.1	8.4	14.2	3.6	4.4	1.1	0.2	9.3	19.5
WSW	4.0	4.6	.4	.3	9.3	16.8	5.6	5.9	1.7	.1	13.3	18.0	5.2	7.5	3.2	.4	16.3	20.8
W	7.4	5.0	.5	.3	13.2	15.2	4.7	8.7	3.8	.4	17.6	20.9	7.2	10.4	5.4	2.3	25.3	23.5
WNW	5.8	4.7	1.0	.3	11.8	16.9	5.3	6.3	2.8	.9	15.3	20.5	4.1	7.5	3.7	.9	16.2	22.0
NW	4.4	2.4	.4	.1	7.3	14.8	6.0	3.5	.6		10.1	14.0	3.0	3.2	.9	.2	7.3	18.4
NNW	2.3	1.7			4.0	12.8	2.2	1.1	.5	.1	3.9	15.5	2.9	1.4	.2		4.5	13.0
Total, percent	60.8	31.8	3.2	1.2	97.0	13.4	50.8	35.2	9.8	1.6	97.4	15.9	38.3	39.6	15.4	4.0	97.3	19.3
	Percent 0–3 knots 3.0 Number of observations 1,188						Percent 0–3 knots 2.6 Number of observations 873						Percent 0–3 knots 2.7 Number of observations 558					

NUEVITAS, CUBA

SPRING (MARCH–MAY)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	2.5				2.5	4.3	1.9				1.9	7.5	0.7				0.7	8.7
NNE	1.3	0.6			1.9	14.8	2.5	1.3			3.8	12.0	2.6	0.6			3.2	11.6
NE	6.8	1.2			8.0	9.7	3.2	1.3	0.6		5.1	16.7	3.9	1.3			5.2	10.9
ENE	14.8	2.5			17.3	9.8	13.3	10.8	.6		24.7	15.0	14.9	6.5			21.4	14.1
S	24.1	1.2			25.3	9.1	12.0	15.2	1.3		28.5	16.5	14.3	8.4	1.3		24.0	14.6
ESE	4.9				4.9	6.8	5.1	3.8			8.9	13.6	5.2	4.6			9.8	14.6
SE	8.6				8.6	4.9	5.7	.6			6.3	8.5	5.8	.7			6.5	8.4
SSE	2.5				2.5	4.6	4.4	.6			5.0	9.1	4.6	.6			5.2	8.4
S	1.2				1.2	7.0	1.9				1.9	6.7	3.9	.7			4.6	6.8
SSW	1.9				1.9	6.1	1.9	.7	.6		3.2	18.4	3.2	1.3	.7		5.2	15.4
SW	2.5				2.5	5.2	3.2	.6			3.8	10.1	3.2	.7			3.9	10.0
WSW							.6				.6	6.1	.7				.7	10.4
W	1.2				1.2	5.2	1.3				1.3	7.4						
WNW													1.9				1.9	4.1
NW	1.3	.6			1.9	10.4		.6			.6	18.2	1.3				1.3	10.0
NNW	.6	.6			1.2	11.3	1.3	.6	.6		2.5	19.1	1.9	.7	.6		3.2	16.2
Total, percent	74.2	6.7			80.9	7.2	58.3	36.1	3.7		98.1	14.0	68.1	26.1	2.6		96.8	12.4
Percent 0–3 knots	19.1						1.9						3.2					
Number of observations	162						158						154					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

NUEVITAS, CUBA—Continued

SPRING (MARCH-MAY)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	3.6	0.9			4.5	8.1	1.2				1.2	8.7	5.1				5.1	8.7
NNE	1.8	.9			2.7	11.0	5.0				5.0	5.4	3.4				3.4	8.7
NE	8.0	.9	0.9		9.8	10.3	2.5				2.5	7.8						
ENE	7.1	4.5			11.6	13.0	1.3	1.2			2.5	11.0	8.5				8.5	8.0
E	6.2	.9			7.1	9.4	3.8	2.5			6.3	11.8	5.1				5.1	9.6
ESE	5.4				5.4	7.4	8.7				8.7	8.1						
SE	8.0	.9			8.9	10.0	6.3				6.3	7.8	5.1				5.1	10.2
SSE	9.8				9.8	9.3	6.3	1.2			7.5	11.1	5.1				5.1	8.4
S	8.9	2.7			11.6	9.9	3.8	3.7			7.5	15.6	3.4				3.4	4.6
SSW	4.4	1.8			6.2	11.7	10.0	2.5			12.5	10.6	11.8	1.7			13.5	11.1
SW	2.7				2.7	7.5	11.3	1.2			12.5	8.9	8.4	5.1			13.5	12.6
WSW	4.4	2.7			7.1	10.0	3.8	2.5			6.3	10.1	11.8	1.7			13.5	9.8
W	1.8				1.8	8.7	3.8	1.2			5.0	10.4	3.4	3.4			6.8	15.8
WNW	.9				.9	8.7	2.5				2.5	7.8	1.7	3.4			5.1	14.2
NW	3.6				3.6	4.2	1.2				1.2	13.0	3.4				3.4	8.7
NNW	.9				.9	4.3	3.8	1.2			5.0	9.6	1.7	3.4			5.1	13.6
Total, percent	77.5	16.2	.9		94.6	9.8	75.3	17.2			92.5	9.8	77.9	18.7			96.6	10.6
	Percent 0–3 knots 5.4 Number of observations 112						Percent 0–3 knots 7.5 Number of observations 80						Percent 0–3 knots 3.4 Number of observations 59					

SUMMER (JUNE–AUGUST)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	0.6				0.6	10.4	0.7				0.7	3.5						
NNE								0.7			.7	17.4	1.3	0.7			2.0	8.5
NE	3.8				3.8	6.8	3.2	2.0			5.2	14.0	2.6	.7	0.7		4.0	12.5
ENE	16.0	0.6			16.6	8.7	7.8	9.0	1.3		18.1	15.4	8.6	8.6	.7		17.9	15.6
E	38.3	1.9			40.2	8.8	22.6	19.4			42.0	14.7	18.6	19.8			38.4	15.9
ESE	11.5				11.5	6.1	11.0	5.8			16.8	12.5	11.3	4.6			15.9	12.9
SE	7.0				7.0	5.1	6.5	1.3			7.8	11.6	5.3	.7	.6		6.6	12.8
SSE	.6				.6	3.9	.6				.6	5.2	5.3				5.3	5.7
S	1.3				1.3	3.6	.6				.6	5.2	2.0				2.0	6.3
SSW							.6				.6	6.9	.7				.7	6.5
SW	.6				.6	7.0	.6				.6	8.7	.6				.6	10.4
WSW							.6				.6	6.1						
W	.6				.6	7.0	.6				.6	10.4						
WNW	.6				.6	4.3												
NW							.6				.6	5.2	1.3				1.3	6.1
NNW							.6				.6	6.1	.7				.7	7.8
Total, percent	80.9	2.5			83.4	6.8	56.6	38.2	1.3		96.1	13.5	58.3	35.1	2.0		95.4	13.4
Percent 0–3 knots	16.6						3.9						4.6					
Number of observations	157						155						151					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

NUEVITAS, CUBA—Continued

SUMMER (JUNE-AUGUST)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N							1.1				1.1	13.0						
NNE	0.8	0.8			1.6	10.9	3.2	1.1			4.3	8.5	3.8				3.8	11.0
NE	5.8	1.6			7.4	10.4	5.4	1.1			6.5	9.4	1.3				1.3	4.3
ENE	5.0	4.9			9.9	13.6	5.4	2.1			7.5	10.3	9.0	3.8			12.8	11.9
E	15.7	8.3			24.0	12.0	12.9	3.2	1.1		17.2	12.7	9.0	2.5			11.5	10.2
ESE	14.1	2.5	0.8		17.4	11.4	8.6	1.1			9.7	11.2	12.8		1.3		14.1	9.6
SE	9.9	2.5	0.8		13.2	12.1	9.7	2.1			11.8	11.3	2.5	1.3			3.8	13.6
SSE	5.8	1.6			7.4	10.3	10.7	1.1			11.8	9.8	7.7	1.3			9.0	9.2
S	4.1	1.7			5.8	10.5	7.5	4.3			11.8	11.7	9.0	1.3			10.3	11.4
SSW	2.5				2.5	4.6	5.3	1.1			6.4	10.3	9.0	1.3			10.3	9.1
SW	1.7				1.7	11.7	5.4				5.4	9.6	7.7	2.5			10.2	9.4
WSW	2.5				2.5	4.0	1.1				1.1	5.2						
W	.8				.8	4.3							2.6				2.6	9.1
WNW	.8				.8	8.7	1.1				1.1	6.9	1.3				1.3	7.4
NW																		
NNW	2.5				2.5	8.1	1.1				1.1	12.2	2.6				2.6	9.1
Total, percent	72.0	23.9	1.6		97.5	11.2	78.5	17.2	1.1		96.8	10.8	78.3	14.0	1.3		93.6	9.8
	Percent 0–3 knots 2.5 Number of observations 121						Percent 0–3 knots 3.2 Number of observations 93						Percent 0–3 knots 6.4 Number of observations 78					

Autumn (September–November)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	3.1				3.1	8.2	1.3	1.2	0.6		3.1	19.6	0.6	1.9	0.6		3.1	17.2
NNE	1.8				1.8	11.9	1.2	2.5			3.7	13.6	4.4	1.2			5.6	9.8
NE	8.6	1.8			10.4	9.2	11.7	6.2	.6		18.5	13.6	10.1	6.3	.6		17.0	14.5
ENE	12.9	1.8			14.7	10.1	10.5	14.2	1.2		25.9	16.3	12.0	11.3	1.2	0.6	25.1	15.6
E	23.2	.6			23.8	7.6	10.5	10.5	.6		21.6	15.8	9.4	8.2	.6		18.2	14.5
ESE	7.3	.6			7.9	5.4	5.0	3.7			8.7	13.8	6.9	3.2	.6		10.7	14.2
SE	7.3				7.3	4.8	1.9			0.6	2.5	16.1	1.3	.6			1.9	10.7
SSE	1.8				1.8	5.5							1.3		.6		1.9	16.8
S	1.2				1.2	3.5	2.5	.6		.6	3.7	21.3	1.3	1.2	.6		3.1	19.4
SSW	0.6				.6	7.0	2.5		.6		3.1	13.5	0.7	.6			1.3	16.9
SW	1.8				1.8	5.4							1.3		.6		1.9	15.0
WSW													1.3				1.3	8.2
W							2.5	.6			3.1	10.1	.7	.6			1.3	13.0
WNW	.6				.6	6.1		.6			.6	19.1	1.3				1.3	5.2
NW	.6				.6	4.3	.6				.6	14.8	1.3				1.3	4.8
NNW							.6	.6			1.2	16.9	.7	.6			1.3	13.4
Total, percent	70.8	4.8			75.6	6.3	50.8	40.7	3.6	1.2	96.3	15.2	54.6	35.7	5.4	.6	96.3	14.0
Percent 0–3 knots	24.4						3.7						3.7					
Number of observations	164						162						159					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

NUEVITAS, CUBA—Continued

AUTUMN (SEPTEMBER-NOVEMBER)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	0.8				0.8	5.6	2.1				2.1	3.2	2.7				2.7	7.0
NNE	4.9	0.8			5.7	10.8	5.3	1.1			6.4	9.6	2.7				2.7	9.6
NE	8.1	3.3			11.4	12.3	9.7				9.7	8.1	6.9				6.9	11.8
ENE	9.0	4.9	0.8		14.7	12.1	3.2	4.3			7.5	14.5	9.6	2.7			12.3	11.2
E	12.2	4.9	0.8		17.9	12.2	8.6	5.4			14.0	10.9	4.1	5.5			9.6	14.8
ESE	6.5	1.6			8.1	12.4	8.6	1.1			9.7	9.1	13.7	2.8			16.5	9.8
SE	4.1		0.8		4.9	11.4	9.7	2.1		1.1	12.9	13.7	5.5	1.4			6.9	9.6
SSE	4.9		0.8		5.7	13.5	5.4				5.4	8.3	10.9	1.4			12.3	9.1
S	3.3				3.3	9.1	5.4				5.4	10.6	2.7	1.4			4.1	13.9
SSW	6.5	1.6			8.1	10.2	2.1				2.1	10.4	2.7				2.7	7.8
SW	4.1				4.1	7.5	5.4				5.4	8.5	4.1				4.1	7.8
WSW	2.4				2.4	6.4	4.3				4.3	8.2	5.5	1.4			6.9	9.0
W	1.6				1.6	7.0	1.1				1.1	7.0	4.1				4.1	8.4
WNW							3.2				3.2	7.2	4.1				4.1	6.6
NW	2.4				2.4	6.1												
NNW	1.6				1.6	10.9	1.1				1.1	8.7						
Total, percent	72.4	17.1	3.2		92.7	11.0	75.2	14.0		1.1	90.3	9.4	79.3	16.6			95.9	9.8
Percent 0–3 knots						7.3						9.7						4.1
Number of observations						123						93						73

WINTER (DECEMBER–FEBRUARY)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	6.4				6.4	9.3	2.9	2.2			5.1	14.9	2.2	1.5			3.7	14.4
NNE	3.6				3.6	9.4	2.2	3.6			5.8	15.4	3.7	.7			4.4	10.7
NE	11.4	1.4			12.8	10.7	8.0	4.4	0.7		13.1	16.0	5.2	5.1	0.7		11.0	17.1
ENE	6.4	2.8			9.2	12.7	5.8	11.6	4.4		21.8	19.2	9.6	9.6	1.4		20.6	17.3
E	20.6	2.1			22.7	9.2	6.5	13.0	4.4		23.9	20.0	5.1	15.5	4.4		25.0	20.2
ESE	.7				.7	3.8	4.4	4.3			8.7	14.8	6.6	2.2			8.8	12.0
SE	2.1				2.1	2.9	.7	1.5			2.2	16.5	3.0	2.2			5.2	12.4
SSE	.7				.7	5.2	2.9	.7			3.6	9.4	3.7				3.7	9.7
S	.7				.7	4.3	2.2				2.2	8.7						
SSW	.7				.7	4.3	1.4				1.4	7.0	2.2	.7			2.9	14.5
SW							1.4				1.4	7.0	1.5				1.5	7.8
WSW	.7				.7	3.5							1.5				1.5	9.1
W	2.8				2.8	5.4	.7				.7	3.5	.7				.7	2.9
WNW	.7				.7	6.9	.7				.7	13.0	.7				.7	13.0
NW	.7				.7	3.5	.7	2.2			2.9	13.4	1.5	2.2			3.7	13.2
NNW	1.4	.7			2.1	10.1	4.4	.7			5.1	11.3	3.7	.7			4.4	11.6
Total, percent	59.6	7.0			66.6	6.6	44.9	44.2	9.5		98.6	16.4	50.9	40.4	6.5		97.8	15.4
Percent 0–3 knots	33.4						1.4						2.2					
Number of observations	141						138						136					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

NUEVITAS, CUBA—Continued

WINTER (DECEMBER–FEBRUARY)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	3.9	1.0			4.9	8.1	2.8				2.8	7.4	3.6				3.6	5.6
NNE	1.0	1.0			2.0	12.1	2.8				2.8	7.4		1.8			1.8	17.4
NE	7.9	2.0			9.9	12.2	6.9				6.9	9.0	5.3	1.8			7.1	9.6
ENE	9.9	3.0			12.9	11.5	13.9				13.9	9.0	7.1				7.1	8.9
E	9.9	4.0			13.9	13.5	8.3	4.2			12.5	13.3		1.8			1.8	27.8
ESE	1.0	3.9			4.9	17.9	5.6				5.6	7.4	7.1				7.1	11.7
SE	4.9				4.9	7.8	2.8				2.8	5.5	3.5	1.8			5.3	9.6
SSE	4.9	3.0	1.0		8.9	13.6	2.8				2.8	8.3	1.8	1.8			3.6	16.9
S	3.0	1.0			4.0	12.8	5.5	1.4			6.9	11.5	1.8	3.6			5.4	15.9
SSW	1.0				1.0	3.9	6.9				6.9	8.7	1.8				1.8	10.4
SW	4.9				4.9	10.9		2.8			2.8	16.5	7.1	1.8			8.9	13.2
WSW	3.0				3.0	5.8	8.3	1.4			9.7	11.5		10.7			10.7	20.0
W	4.9	1.0			5.9	11.3	8.3	1.4			9.7	10.3	8.9	1.8			10.7	12.2
WNW	3.0	1.0			4.0	8.7	6.9				6.9	9.6	3.6	1.8			5.4	12.7
NW	2.0	2.0			4.0	13.5							3.6	1.8			5.4	11.0
NNW	4.9	1.0			5.9	7.9	2.8	1.4			4.2	9.8	10.7				10.7	9.0
Total, percent	70.1	23.9	1.0		95.0	11.4	84.6	12.6			97.2	10.0	65.9	30.5			96.4	12.3
Percent 0–3 knots	5.0						2.8						3.6					
Number of observations	101						72						56					

SAN JULIAN, CUBA

SPRING (MARCH–MAY)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	4.2				4.2	5.2	1.4				1.4	4.3	1.5	0.8			2.3	10.1
NNE	2.8				2.8	5.4	2.2	1.4			3.6	11.7	2.3				2.3	6.5
NE	9.2				9.2	4.5	2.2	2.1			4.3	15.1	3.0	3.0			6.0	13.2
ENE	9.9				9.9	6.5	6.4	2.9			9.3	12.8	4.5	1.5			6.0	11.3
E	26.8	0.7			27.5	7.4	15.1	10.1	0.7		25.9	14.3	15.8	5.3			21.1	12.6
ESE	4.2	2.1			6.3	8.1	8.7	4.3	.7		13.7	14.2	6.1	3.6	0.8		10.5	14.1
SE	12.0	1.4			13.4	7.6	6.5	6.5			13.0	16.0	9.8	6.0			15.8	14.4
SSE	3.5	.7			4.2	11.0	8.6	2.2	1.4		12.2	13.5	6.8	4.5	1.5		12.8	16.7
S	2.1				2.1	9.0	3.6	.7			4.3	7.9	5.3	2.2			7.5	10.4
SSW	.7				.7	10.4	1.5	.7			2.2	12.2	3.0				3.0	9.1
SW	.7				.7	6.5	2.2				2.2	8.1	1.5				1.5	6.5
WSW	.7				.7	3.5	.7				.7	3.9	1.5				1.5	6.1
W													3.0				3.0	5.0
WNW							1.4				1.4	8.7		.7			.7	15.6
NW	1.4				1.4	3.2	.7				.7	14.8	1.5				1.5	9.1
NNW							1.5	.7			2.2	9.8	.8	.7			1.5	9.6
Total, percent	78.2	4.9			83.1	6.5	62.7	31.6	2.8		97.1	13.2	66.4	28.3	2.3		97.0	12.4
Percent 0–3 knots	16.9						2.9						3.0					
Number of observations	142						139						133					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

SAN JULIAN, CUBA—Continued

SPRING (MARCH–MAY)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	2.5				2.5	9.3	2.1				2.1	9.6	3.4	1.2			4.6	10.6
NNE	.8				.8	5.2	6.3				6.3	8.8	3.4				3.4	8.1
NE	5.0				5.0	7.5	3.1				3.1	5.8	4.6	1.2			5.8	9.6
ENE	4.2	0.8			5.0	9.3	5.3	1.0			6.3	9.7	4.6	1.2			5.8	10.2
E	11.6	1.7			13.3	9.6	9.5				9.5	8.5	3.4	1.2			4.6	11.7
ESE	10.0	.9			10.9	9.8	8.4	2.1			10.5	10.6	4.6	1.2			5.8	8.9
SE	8.4	2.5			10.9	11.2	6.3				6.3	9.1	5.8				5.8	8.7
SSE	12.5	3.4			15.9	11.4	7.4				7.4	5.7	8.0				8.0	6.0
S	6.7	2.5			9.2	9.0	4.2				4.2	8.2	2.3				2.3	6.1
SSW	4.2	.8			5.0	9.0	5.3				5.3	6.2	4.6				4.6	5.6
SW	5.0	.8			5.8	10.7	10.5				10.5	7.6	4.6	3.4			8.0	11.8
WSW	3.3				3.3	6.5	5.3	1.0			6.3	8.9	4.6	1.1			5.7	9.4
W	1.7	1.6			3.3	15.2	4.2	1.1			5.3	10.2	6.9	4.6			11.5	12.2
WNW	.9	.8			1.7	11.3	6.3	2.1			8.4	11.6	8.0	2.3			10.3	10.0
NW	2.5	.8			3.3	11.5	2.1	1.1			3.2	13.0	6.9	3.4			10.3	11.5
NNW	3.3				3.3	6.1	3.2				3.2	8.7	1.2				1.2	6.9
Total, percent	82.6	16.6			99.2	9.8	89.5	8.4			97.9	8.9	76.9	20.8			97.7	9.7
	Percent 0–3 knots					0.8	Percent 0–3 knots					2.1	Percent 0–3 knots					2.3
	Number of observations					120	Number of observations					95	Number of observations					87

SUMMER (JUNE-AUGUST)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	0.8				0.8	4.3												
NNE	2.5				2.5	3.0	2.5				2.5	7.2	2.5				2.5	6.7
NE	5.0				5.0	4.1	.8				.8	6.9	2.5				2.5	7.8
ENE	14.9				14.9	7.0	4.2	0.8			5.0	8.5	5.0	0.8			5.8	8.2
E	31.4	2.5			33.9	6.4	15.7	14.1			29.8	13.8	17.5	5.0			22.5	12.2
ESE	5.0				5.0	7.2	17.4	10.7			28.1	12.9	15.0	11.7			26.7	13.7
SE	13.3	.8			14.1	7.5	10.8	4.1			14.9	12.2	13.4	5.0			18.4	11.6
SSE	.8				.8	8.7	2.5	3.3	0.8		6.6	17.1	5.9	5.0	0.8		11.7	15.2
S	.8				.8	5.2	1.7	.8			2.5	14.7	2.5				2.5	7.8
SSW							.8	.8			1.6	10.8	.8				.8	13.9
SW	.8				.8	4.3	1.6				1.6	5.2	.8				.8	6.9
WSW	.8				.8	5.2	.8	.8			1.6	15.6	.9	.8			1.7	13.0
W	.8				.8	3.5							1.7				1.7	6.1
WNW							1.7				1.7	3.9	.8				.8	5.2
NW													.8				.8	5.2
NNW																		
Total, percent	76.9	3.3			80.2	5.8	60.5	35.4	.8		96.7	12.5	70.1	28.3	.8		99.2	12.0
Percent 0–3 knots	19.8						3.3						0.8					
Number of observations	121						121						120					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

SAN JULIAN, CUBA—Continued

SUMMER (JUNE–AUGUST)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	0.9				0.9	3.9	1.1				1.1	5.2	4.8				4.8	5.0
NNE	2.8				2.8	6.1	3.3				3.3	6.4	2.4				2.4	11.7
NE	1.9				1.9	9.1	3.3				3.3	9.3	6.0	1.2			7.2	9.7
ENE	14.0				14.0	7.7	8.8	2.2			11.0	10.7	4.8	3.6			8.4	11.0
E	12.2	4.7			16.9	11.2	12.1	5.5			17.6	11.7	7.3	3.6			10.9	9.7
ESE	12.1	1.9			14.0	10.0	15.4	2.2			17.6	10.6	18.1				18.1	9.1
SE	14.1	5.6			19.7	10.4	12.1	2.2			14.3	9.3	14.5	1.2			15.7	9.4
SSE	9.4	2.8			12.2	11.0	8.7				8.7	9.8	7.3	2.4			9.7	10.8
S	5.6	1.0			6.6	9.8	4.4				4.4	7.8	3.6	1.2			4.8	11.1
SSW	1.9	.9			2.8	8.7	3.3	1.1			4.4	12.2	3.6	1.2			4.8	10.0
SW	.9				.9	3.5	2.2				2.2	6.5	1.2				1.2	8.7
WSW	.9				.9	5.2	2.2				2.2	4.3	2.4				2.4	4.8
W	.9				.9	5.2	4.4				4.4	5.2	6.0				6.0	6.1
WNW													1.2				1.2	3.5
NW	.9				.9	4.3							1.2				1.2	3.5
NNW	.9				.9	3.5	3.3				3.3	4.3	1.2				1.2	4.3
Total, percent	79.4	16.9			96.3	9.5	84.6	13.2			97.8	9.4	85.6	14.4			100.0	9.1
	Percent 0–3 knots					3.7	Percent 0–3 knots					2.2	Percent 0–3 knots					0
	Number of observations					107	Number of observations					91	Number of observations					83

AUTUMN (SEPTEMBER-NOVEMBER)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	8.7				8.7	4.6	2.4	0.8			3.2	14.5	3.3	0.8			4.1	10.0
NNE	7.9	0.8			8.7	6.6	5.7	2.4			8.1	12.6	5.0	0.8			5.8	11.2
NE	7.9				7.9	5.9	1.6	6.5	0.8		8.9	19.2	5.8	5.7			11.5	15.2
ENE	15.1				15.1	6.2	8.1	6.4	2.4		16.9	17.2	7.4	5.7	2.5		15.6	17.8
E	30.2	1.6			31.8	6.1	8.1	10.5	2.4		21.0	18.3	5.7	6.6	1.6		13.9	16.9
ESE	3.9				3.9	7.5	11.3	8.1	.8		20.2	14.0	6.6	6.5			13.1	15.1
SE	1.6				1.6	3.1	4.9	3.2			8.1	13.1	9.8	4.1			13.9	13.0
SSE	.8				.8	10.4	3.2	.8			4.0	12.2	3.3	1.6			4.9	11.6
S	1.6				1.6	5.2	1.6				1.6	13.5	5.7				5.7	8.7
SSW							3.2				3.2	9.6	2.5				2.5	9.3
SW							1.6				1.6	4.3	2.5				2.5	7.2
WSW	.8				.8	5.2												
W							.8				.8	12.2		.8			.8	15.6
WNW													.8				.8	10.4
NW	.8				.8	5.2												
NNW							1.6	.8			2.4	14.5	3.3	.8			4.1	8.9
Total, percent	79.3	2.4			81.7	5.4	54.1	39.5	6.4		100.0	15.4	61.7	33.4	4.1		99.2	13.8
Percent 0–3 knots	18.3						0						0.8					
Number of observations	126						124						122					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

SAN JULIAN, CUBA—Continued

AUTUMN (SEPTEMBER–NOVEMBER)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	0.9	1.8			2.7	17.7	1.0				1.0	8.7	3.6				3.6	11.0
NNE	4.5				4.5	9.0	8.4	1.1			9.5	10.4	9.7				9.7	7.3
NE	14.6	.9			15.5	8.8	11.5				11.5	6.9	12.0	1.2			13.2	9.2
ENE	6.4	2.7			9.1	12.1	6.3	3.2			9.5	9.3	8.5				8.5	9.0
E	12.8	2.7			15.5	9.8	10.5	3.2			13.7	11.1	8.4	2.4			10.8	12.6
ESE	6.4	4.5			10.9	13.7	6.3	3.2			9.5	14.0	3.6	3.6			7.2	13.9
SE	9.1	.9			10.0	10.2	4.2	1.0			5.2	9.4	7.3	2.4			9.7	9.9
SSE	4.6	1.8			6.4	12.5	4.2	3.2			7.4	11.4	1.2	2.4			3.6	14.5
S	4.6	1.8			6.4	10.4	3.2				3.2	8.4	8.5				8.5	6.2
SSW	2.7				2.7	6.4	6.3				6.3	6.1	1.2	1.2			2.4	10.9
SW	2.7				2.7	6.9	3.2				3.2	6.7	4.8				4.8	9.3
WSW							2.1				2.1	9.6	2.4				2.4	8.7
W	.9				.9	3.5	2.1				2.1	11.7						
WNW	1.8				1.8	9.1	3.2				3.2	10.7	7.2				7.2	8.4
NW	8.2				8.2	9.2	2.1	1.1			3.2	9.3	2.4				2.4	6.1
NNW	2.7				2.7	8.7	3.1	2.1			5.2	12.9	1.2	2.4			3.6	16.2
Total, percent	82.9	17.1			100.0	10.4	77.7	18.1			95.8	10.0	82.0	15.6			97.6	9.9
	Percent 0–3 knots ..... 0 Number of observations 110						Percent 0–3 knots ..... 4.2 Number of observations 95						Percent 0–3 knots ..... 2.4 Number of observations 83					

WINTER (DECEMBER–FEBRUARY)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	8.8				8.8	5.8	3.5	2.3			5.8	14.5	3.5	2.3			5.8	15.1
NNE	4.4				4.4	4.5	2.3	4.6			6.9	18.2	8.1	5.8			13.9	14.1
NE	7.7				7.7	6.0	9.2	8.0			17.2	14.8	5.8	5.8			11.6	14.7
ENE	13.2	3.3			16.5	9.0	3.5	2.3			5.8	12.3	3.5				3.5	10.7
E	23.1				23.1	5.5	2.3	9.2	1.2	1.1	13.8	22.1	2.3	4.6	1.2		8.1	21.4
ESE	4.4				4.4	7.0	5.8	2.3	1.1		9.2	15.2	5.8	4.7			10.5	13.3
SE	4.4				4.4	7.0	2.3	3.4			5.7	13.8	4.6	2.3	1.2		8.1	13.9
SSE							2.3	1.2			3.5	15.6	2.3	3.5			5.8	18.1
S	6.6				6.6	8.7	5.7	4.6			10.3	13.5	7.0	3.5			10.5	13.1
SSW	1.1				1.1	13.0	2.3	2.3			4.6	15.4	2.3	2.3			4.6	14.8
SW							1.2				1.2	8.7	3.5				3.5	7.5
WSW								1.1			1.1	15.6	1.2				1.2	3.5
W	1.1				1.1	3.5	1.1				1.1	6.9		1.2			1.2	17.4
WNW	1.1				1.1	3.5	1.1	3.5			4.6	17.2	1.2	2.3			3.5	17.4
NW	1.1				1.1	10.4	2.3	4.6			6.9	15.5	2 3	4.7			7.0	17.2
NNW	3.3				3.3	6.3												
Total, percent	80.3	3.3			83.6	6.0	44.9	49.4	2.3	1.1	97.7	15.7	53.4	43.0	2.4		98.8	14.6
Percent 0–3 knots	16.4						Percent 0–3 knots	2.3					Percent 0–3 knots	1.2				
Number of observations	91						Number of observations	87					Number of observations	86				

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

SAN JULIAN, CUBA—Continued

WINTER (DECEMBER-FEBRUARY)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	3.0	1.5			4.5	9.8	1.8	1.7			3.5	14.3	4.5	2.2			6.7	13.9
NNE	10.4				10.4	10.5	14.0	1.8			15.8	11.0	2.2				2.2	8.7
NE	10.4	1.5			11.9	11.7	5.3				5.3	8.4	6.7				6.7	11.0
ENE	4.5	1.5			6.0	9.3	5.3				5.3	10.4	2.2				2.2	7.8
E	7.4				7.4	7.6												
ESE	4.5				4.5	4.9	3.5				3.5	8.7	4.5				4.5	6.1
SE	1.5				1.5	7.0	3.5				3.5	10.4	4.4				4.4	10.8
SSE		3.0			3.0	22.6	3.5	1.8			5.3	14.2	4.4				4.4	6.5
S	4.5	1.5			6.0	11.3	1.7				1.7	13.0	6.7				6.7	10.7
SSW	6.0	3.0			9.0	11.7	3.5				3.5	9.1	6.7	2.2			8.9	12.0
SW	1.5	1.5			3.0	7.0	1.7				1.7	11.3	4.4				4.4	9.1
WSW	7.4				7.4	7.6	14.0	5.3			19.3	11.8	8.9	2.2			11.1	10.8
W	10.4				10.4	9.4	3.5	1.8			5.3	12.1	4.5	2.2			6.7	13.9
WNW	1.5				1.5	4.3	7.0	3.5			10.5	12.9	8.9	4.4			13.3	12.8
NW	1.5	3.0			4.5	20.3	8.8				8.8	10.1	4.4	6.7			11.1	15.4
NNW	3.0	1.5			4.5	11.0	3.5	3.5			7.0	14.5	6.7				6.7	6.3
Total, percent	77.5	18.0			95.5	10.4	80.6	19.4			100.0	11.7	80.1	19.9			100.0	11.2
	Percent 0–3 knots					4.5	Percent 0–3 knots					0	Percent 0–3 knots					0
	Number of observations					67	Number of observations					57	Number of observations					45

KINGSTON, JAMAICA

SPRING (MARCH-MAY)

	Surface (108 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	21.5	0.1			21.6	4.5	.6	0.2			0.8	5.5	0.7	0.1			0.8	4.5
NNE	29.2				29.2	4.4	.4	.1			.5	3.4	.8				.8	3.3
NE	5.0				5.0	3.4	.4				.4	3.2	2.8				2.8	5.8
ENE	.9				.9	2.6	.9	.1			1.0	3.5	3.9				3.9	5.3
E	.9				.9	3.4	5.5	.5			6.0	6.0	11.3	8.8	0.8		20.9	13.0
ESE	2.6	.2			2.8	6.4	26.1	14.0			40.1	12.7	12.6	30.1	1.3		44.0	2.2
SE	4.9	.5			5.4	7.6	9.0	2.5			11.5	8.5	4.8	3.2	.1		8.1	12.5
SSE	.3				.3	5.3	2.0				2.0	3.4	1.5	.4			1.9	8.0
S	.2				.2	4.8	1.7				1.7	3.1	.6				.6	4.0
SSW							.8				.8	3.0	.5				.5	5.0
SW							1.1				1.1	3.2	.4				.4	4.1
WSW	.2				.2	3.9	.8				.8	2.7	.3				.3	2.9
W	.3				.3	3.9	1.4				1.4	3.1	.5				.5	3.3
WNW	.1				.1	2.2	1.9				1.9	3.5	.1				.1	2.3
NW	.5				.5	2.9	.7				.7	2.5	.4				.4	2.7
NNW	2.5	.1			2.6	3.8	2.0				2.0	3.7	.8				.8	3.4
Total, percent	69.1	.9			70.0	4.4	55.3	17.4			72.7	7.8	42.0	42.6	2.2		86.8	13.1
	Percent 0–3 knots					30.0	Percent 0–3 knots					27.3	Percent 0–3 knots					13.2
	Number of observations					984	Number of observations					977	Number of observations					973

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

KINGSTON, JAMAICA—Continued

SPRING (MARCH–MAY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	1.1				1.1	7.6	1.7	0.1			1.8	6.7	3.0	0.5			3.5	9.5
NNE	1.0	0.1			1.1	7.5	3.0	.2			3.2	8.3	3.6	1.1	0.3		5.0	12.0
NE	3.6	.9			4.5	8.4	4.6	1.1	0.1		5.8	9.8	5.0	2.1			7.1	9.8
ENE	7.5	2.0	0.1		9.6	10.7	8.6	3.0	.1		11.7	11.2	6.8	3.3			10.1	11.3
E	12.8	12.5	.8		26.1	6.4	8.9	4.7	.5	0.1	14.2	13.7	5.0	2.2	.3	0.1	7.6	12.2
ESE	11.4	14.8	1.0		27.2	16.0	10.5	5.0			15.5	11.5	5.8	1.6			7.4	10.4
SE	7.9	5.5	.2		13.6	13.5	9.2	2.0			11.2	9.5	4.6	.9	.3		5.8	10.2
SSE	3.8	.9			4.7	11.0	6.0	1.1			7.1	9.5	3.5	1.1			4.6	8.6
S	1.9	.2			2.1	7.5	4.2	1.2			5.4	9.4	4.2	.8			5.0	8.6
SSW	1.0				1.0	5.6	3.3	.1			3.4	7.7	4.1	.5			4.6	8.3
SW	.6	.2			.8	8.6	2.4	.9	.1		3.4	10.7	3.9	1.6	.5		6.0	12.8
WSW	.8	.3			1.1	8.8	2.0	.5	.1		2.6	11.8	4.9	2.1			7.0	11.0
W	.9				.9	8.0	1.5	.5	.1		2.1	11.0	4.6	1.9	.2		6.7	10.3
WNW	.8				.8	4.8	1.4	.4			1.8	10.2	3.6	1.8			5.4	10.5
NW	.5	.1			.6	6.9	2.1	.2			2.3	9.0	3.0	.6			3.6	10.2
NNW	.6				.6	8.2	1.9	.1			2.0	8.7	2.2	.3			2.5	8.4
Total, percent	56.2	37.5	2.1		95.8	13.0	71.3	21.1	1.0	.1	93.5	10.5	67.8	22.4	1.6	.1	91.9	10.3
	Percent 0–3 knots					4.2	Percent 0–3 knots					6.5	Percent 0–3 knots					8.1
	Number of observations					907	Number of observations					767	Number of observations					633

SUMMER (JUNE-AUGUST)

	Surface (108 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	26.4				26.4	3.9	0.3				0.3	2.7	0.4				0.4	3.2
NNE	25.4				25.4	4.3	.6				.6	4.8	.5				.5	3.9
NE	3.8				3.8	3.4	.3				.3	2.5	1.7				1.7	5.2
ENE	.7				.7	3.4	1.4				1.4	3.1	2.7				2.7	6.8
E	1.2				1.2	3.4	9.7	2.5			12.2	7.6	11.7	25.4	1.6		38.7	18.0
ESE	3.5	0.1			3.6	6.2	32.2	18.6	0.6		51.4	12.8	5.8	33.4	5.5		44.7	20.8
SE	3.7	.4			4.1	8.6	6.2	1.3	.2		7.7	9.5	1.6	2.9	.1		4.6	16.0
SSE	.3				.3	7.1	.8				.8	5.1	.4				.4	5.1
S	.1				.1	2.7	.5				.5	2.7	.1				.1	5.2
SSW							.3				.3	2.6	.2				.2	5.3
SW	.1				.1	2.6	.5				.5	2.6	.2				.2	3.4
WSW	.1				.1	3.9	.7				.7	2.6	.2				.2	3.2
W	.1				.1	2.4	.6				.6	2.9	.2				.2	3.9
WNW	.2				.2	3.4	1.3				1.3	3.7						
NW	.7				.7	3.1	.7				.7	3.3						
NNW	2.8				2.8	3.3	.5				.5	2.7	.4				.4	3.4
Total, percent	69.1	.5			69.6	4.1	56.6	22.4	.8		79.8	9.5	26.1	61.7	7.2		95.0	17.7
	Percent 0–3 knots 30.4 Number of observations 1,038						Percent 0–3 knots 20.2 Number of observations 1,037						Percent 0–3 knots 5.0 Number of observations 1,034					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

KINGSTON, JAMAICA—Continued

SUMMER (JUNE-AUGUST)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N							0.7				0.7	4.5	0.3				0.3	5.8
NNE	0.3				0.3	8.4	1.3	0.1			1.4	5.0	1.1	0.3			1.4	9.5
NE	.9	0.4			1.3	11.9	2.1	.6	0.1		2.8	10.5	2.4	.6	0.2		3.2	11.0
ENE	4.0	2.5	0.1		6.6	13.6	6.0	3.8	.5		10.3	15.0	9.0	6.7	.2		15.9	14.1
E	7.5	20.2	3.0		30.7	19.5	13.2	13.4	1.4		28.0	15.8	16.5	12.4			28.9	13.5
ESE	6.8	31.5	7.6		45.9	21.3	14.6	15.3	2.4	0.1	32.4	16.6	15.8	9.0	.5		25.3	13.4
SE	2.8	8.2	1.0		12.0	19.0	9.3	5.8	.8	0.1	16.0	14.0	8.0	2.6	.2		10.8	12.1
SSE	1.1	.8	.1		2.0	14.0	2.3	1.4	.2		3.9	14.3	4.1	.5			4.6	8.7
S	.3				.3	9.7	1.0	.1			1.1	8.7	2.2	.3			2.5	9.0
SSW	.4				.4	10.7	.5				.5	9.7	1.4	.3			1.7	9.0
SW	.2				.2	6.8	.4	.1			.5	13.6	.2	.1			.3	13.6
WSW							.4				.4	6.3	.5				.5	6.3
W							.1				.1	6.8	.2	.1			.3	9.7
WNW																		
NW													.6				.6	5.3
NNW	.1				.1	3.9	.1				.1	6.8	.8	.1			.9	8.4
Total, percent	24.4	63.6	11.8		99.8	19.6	52.0	40.6	5.4	.2	98.2	15.0	63.1	33.0	1.1		97.2	12.6
	Percent 0–3 knots 0.2 Number of observations 998						Percent 0–3 knots 1.8 Number of observations 847						Percent 0–3 knots 2.8 Number of observations 651					

Autumn (September–November)

	Surface (108 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	25.4	0.2			25.6	4.4	1.4				1.4	4.4	1.0				1.0	3.5
NNE	29.1				29.1	4.3	1.0				1.0	3.8	1.0				1.0	3.7
NE	4.8				4.8	3.6	.9				.9	3.4	4.0	0.7			4.7	7.6
ENE	.9				.9	2.4	1.5	0.1			1.6	3.8	4.9				4.9	5.4
E	.6				.6	2.5	6.1	.6			6.7	5.5	13.3	9.4	0.4		23.1	13.5
ESE	2.7	.1			2.8	5.4	20.8	8.5			29.3	11.0	15.6	20.3	1.5		37.4	16.0
SE	1.2				1.2	4.8	9.6	2.1	0.1		11.8	7.9	5.6	2.3	.1		8.0	10.2
SSE	.1				.1	2.9	2.2	.1			2.3	4.1	1.7	.3			2.0	6.3
S							1.3				1.3	3.2	.8				.8	5.3
SSW	.2				.2	5.8	1.1				1.1	3.2	.7				.7	6.5
SW	.1				.1	3.9	1.3				1.3	2.9						
WSW							2.2				2.2	3.8	.5				.5	3.6
W	.1				.1	2.3	1.8				1.8	3.1	.6	.2			.8	6.7
WNW							1.9				1.9	3.7	.4	.1			.5	4.8
NW	.4				.4	3.6	1.2				1.2	2.9	.6	.1			.7	4.6
NNW	1.8				1.8	3.4	.8	.1			.9	4.0	.6				.6	3.6
Total, percent	67.4	.3			67.7	4.0	55.1	11.5	.1		66.7	6.4	51.3	33.4	2.0		86.7	11.9
Percent 0–3 knots						32.3						33.3						13.3
Number of observations						985						982						975

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

KINGSTON, JAMAICA—Continued

AUTUMN (SEPTEMBER–NOVEMBER)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	0.5				0.5	4.2	1.5	0.2			1.7	8.4	3.1	0.1			3.2	7.5
NNE	1.4	0.1			1.5	6.0	2.2				2.2	5.1	3.2	.3			3.5	8.3
NE	3.0	.5			3.5	7.8	6.7	.8			7.5	8.8	8.8	1.2			10.0	9.3
ENE	8.7	1.5			10.2	10.0	10.4	1.9			12.3	11.0	9.5	4.1			13.6	11.5
E	15.6	13.2	0.6		29.4	14.4	16.7	7.3			24.0	11.8	15.0	5.7	0.3		21.0	11.8
ESE	13.9	15.7	1.4		31.0	15.9	13.9	6.6	0.4		20.9	12.3	10.1	3.6			13.7	11.2
SE	6.3	4.3			10.6	13.1	8.9	3.3		0.1	12.3	11.5	7.0	1.4			8.4	10.1
SSE	2.5	1.1			3.6	10.0	3.7	.6			4.3	9.1	4.5	.1			4.6	7.3
S	1.0	.5			1.5	6.8	1.6	.4			2.0	9.1	2.6	.1			2.7	7.1
SSW	1.5				1.5	7.5	.7				.7	6.9	1.9	.1			2.0	7.1
SW	.5				.5	4.7	1.9	.3			2.2	8.3	2.1	.1			2.2	8.5
WSW	.5				.5	9.3	.6				.6	6.0	1.6	.1			1.7	7.1
W	.3	.1			.4	8.2	1.3	.3			1.6	10.5	1.3				1.3	6.7
WNW	.5				.5	6.6	.5	.2			.7	8.8	1.5				1.5	7.1
NW	.1				.1	2.9	.6				.6	6.5	1.2				1.2	6.5
NNW	.1	.1			.2	10.4	.6				.6	7.1	1.7				1.7	6.7
Total, percent	56.4	37.1	2.0		95.5	13.0	71.8	21.9	.4	.1	94.2	10.7	75.1	16.9	.3		92.3	9.9
Percent 0–3 knots						4.5						5.8						7.7
Number of observations						937						828						692

Winter (December–February)

	Surface (108 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	23.4	0.1			23.5	4.6	1.4	0.4	0.1		1.9	8.1	1.3				1.3	4.0
NNE	35.6				35.6	5.0	1.6	.1			1.7	3.9	1.9	0.1			2.0	4.7
NE	6.3				6.3	3.7	1.4				1.4	3.6	5.2	1.0			6.2	7.0
ENE	1.0				1.0	2.9	1.6				1.6	3.8	10.4	.6			11.0	6.5
E	2.2				2.2	3.5	5.4	.6	.1		6.1	6.5	14.0	8.9	0.6		23.5	12.3
ESE	1.6				1.6	5.4	16.8	6.2			23.0	10.6	12.1	16.3	.8		29.2	15.4
SE	1.4	.2			1.6	6.6	6.2	.4			6.6	6.2	3.0	1.4			4.4	9.3
SSE	.2				.2	3.2	2.7				2.7	3.6	.9				.9	3.5
S	.1				.1	2.9	3.2				3.2	3.1	.3				.3	5.3
SSW							2.4				2.4	3.1	.4				.4	3.2
SW							2.4				2.4	3.2	.3				.3	2.8
WSW	.1				.1	2.9	1.8				1.8	3.0	.3				.3	2.8
W							1.5				1.5	2.8	.4				.4	3.1
WNW	.4				.4	2.9	2.4				2.4	3.4	.8				.8	5.0
NW	1.1				1.1	3.9	.8				.8	3.6	.3				.3	3.7
NNW	2.4	.1			2.5	4.3	1.7				1.7	3.9	1.1				1.1	5.3
Total, percent	75.8	.4			76.2	4.5	53.3	7.7	.2		61.2	5.7	52.7	28.3	1.4		82.4	10.4
Percent 0–3 knots						23.8						38.8						17.6
Number of observations						974						972						968

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—CON.

KINGSTON, JAMAICA—Continued

WINTER (DECEMBER–FEBRUARY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	1.3	0.1			1.4	6.6	2.8	0.1			2.9	7.6	1.5	0.4			1.9	8.8
NNE	3.1	.1			3.2	6.2	3.1	.5			3.6	8.3	4.1	.6			4.7	9.2
NE	4.6	1.2			5.8	9.5	5.8	1.6			7.4	10.6	6.3	2.6	0.2		9.1	12.1
ENE	10.9	2.7			13.6	10.2	10.4	4.7	0.4		15.5	13.2	9.7	6.0	1.0		16.7	10.0
E	15.3	14.2	1.5		31.5	15.0	12.8	9.9	1.3		24.0	15.1	7.8	9.9	.7		18.4	15.7
ESE	9.0	14.0	.9		23.9	17.0	7.4	7.5	.6		15.5	15.0	6.3	5.6	.1		12.0	14.8
SE	4.0	2.9			6.9	11.8	5.2	2.9	.1		8.2	12.5	4.0	1.2			5.2	10.9
SSE	3.4	.9			4.3	9.2	2.9	.6			3.5	9.3	2.2	1.3			3.5	10.6
S	.4	.1			.5	9.3	1.8	.1			1.9	9.6	2.1	.1			2.2	8.1
SSW	.5				.5	4.4	1.2	.1			1.3	6.0	1.6	.3			1.9	8.7
SW	.4				.4	7.0	1.8	.3			2.1	10.0	2.2	.3			2.5	8.8
WSW	.4				.4	7.5	1.0	.5			1.5	9.6	2.3	1.2			3.5	10.4
W	.2	.1			.3	9.7	1.3	.1			1.4	7.6	2.9	.4	.4		3.7	12.5
WNW	.7	.1			.8	8.2	2.1	.3			2.4	8.9	1.8	1.0			2.8	12.1
NW	1.0				1.0	6.0	1.3	.2			1.5	9.0	2.4	.6			3.0	11.0
NNW	1.1				1.1	7.8	2.3	.3			2.6	8.4	2.7				2.7	6.2
Total, percent	56.3	36.4	2.4		95.1	13.0	63.2	29.7	2.4		95.3	12.4	59.9	31.5	2.4		93.8	12.6
Percent 0–3 knots						4.9						4.7						6.2
Number of observations						934						797						681

PORT-AU-PRINCE, HAITI

SPRING (MARCH-MAY)

	Surface (59 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N							0.1	0.2			0.3	10.7	0.5	0.3			0.8	9.7
NNE	0.1				0.1	11.6	.4				.4	5.8	.7				.7	4.7
NE	.9				.9	5.8	.9	.2			1.1	9.5	2.6				2.6	6.5
ENE	8.2				8.2	4.8	3.8	1.9			5.7	11.8	10.3	1.1			11.4	8.6
E	35.2				35.2	4.9	18.5	30.6	1.7		50.8	17.0	18.3	21.6	1.6	0.1	41.6	15.2
ESE	11.2				11.2	4.4	8.5	6.2	.3		15.0	13.1	11.5	6.6	.3		18.4	11.8
SE	2.0				2.0	3.8	1.5				1.5	4.4	1.8	.4			2.2	8.2
SSE							.3				.3	4.9	1.5				1.5	4.7
S	.5				.5	3.5	.1				.1	2.6	1.2				1.2	3.9
SSW	.3				.3	2.9	.1				.1	2.9	.4				.4	3.4
SW	.3				.3	3.9	.8				.8	5.6	1.1				1.1	3.9
WSW	.8				.8	5.5	4.2				4.2	7.3	3.0				3.0	6.0
W	2.8				2.8	6.5	9.6	.4			10.0	9.6	4.9				4.9	7.4
WNW	13.3				13.3	8.3	3.5	.1			3.6	8.3	1.5				1.5	6.2
NW	3.2				3.2	7.5	.7				.7	5.8	.4				.4	4.3
NNW	.7				.7	5.4	.3				.3	3.2		.1			.1	19.4
Total, percent	79.5				79.5	4.8	53.3	39.6	2.0		94.9	13.4	59.7	30.1	1.9	.1	91.8	11.3
Percent 0–3 knots	20.5						5.1						8.2					
Number of observations	744						743						732					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

PORT-AU-PRINCE, HAITI—Continued

SPRING (MARCH–MAY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	2.7	0.2			2.9	6.9	2.4	1.2			3.6	11.0	3.4	1.2			4.6	9.7
NNE	2.8	.2			3.0	8.6	6.4	.4			6.8	8.9	2.9	1.7			4.6	11.2
NE	8.5	1.3			9.8	8.9	6.9	.4			7.3	7.3	5.8	1.7			7.5	9.0
ENE	13.1	2.9			16.0	9.9	10.9	5.3			16.2	12.2	4.6	.6			5.2	8.1
E	20.9	7.0			27.9	11.6	8.5	5.7	0.4		14.6	12.3	5.7	2.3			8.0	12.7
ESE	8.2	3.8			12.0	10.8	4.4	.8			5.2	9.7	1.7	1.2			2.9	10.7
SE	5.5	.6			6.1	7.4	6.9	.8			7.7	10.1	4.0	.6			4.6	9.5
SSE	2.5	.2			2.7	6.1	3.6	.8			4.4	11.3	5.2				5.2	7.1
S	3.6	.8			4.4	9.2	4.5	1.6	.4		6.5	12.8	6.3	1.7			8.0	10.8
SSW	1.1	1.0			2.1	11.0	4.8	2.0			6.8	10.3	3.4	.6			4.0	10.5
SW	.8	.2			1.0	9.7	4.5	2.0			6.5	5.7	4.0	2.3	0.6		6.9	15.2
WSW	1.1				1.1	5.0	2.0				2.0	7.4	7.5	2.9			10.4	10.1
W	1.0				1.0	5.8	1.6	.8			2.4	10.1	5.8	1.7			7.5	10.5
WNW	1.5				1.5	4.1	3.2				3.2	4.8	5.2	1.7			6.9	9.5
NW	1.0				1.0	5.5	.8				.8	4.9	1.7				1.7	5.8
NNW	.4	.2			.6	10.3	.4	.8			1.2	13.6	3.4	.6			4.0	7.5
Total, percent	74.7	18.4			93.1	9.5	71.8	22.6	.8		95.2	10.4	70.6	20.8	.6		92.0	10.1
Percent 0–3 knots						6.9						4.8						8.0
Number of observations*						525						248						174

SUMMER (JUNE-AUGUST)

	Surface (59 feet)						1,600 feet						3,300 feet					
	4–14	15–18	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N								0.1			0.1	9.7	0.7	0.1			0.8	6.3
NNE	0.6				0.6	6.3	0.4				.4	5.8	.7				.7	5.3
NE	1.5				1.5	4.3	.3				.3	8.4	1.8				1.8	6.4
ENE	10.9				10.9	4.8	1.8	1.8	0.1	0.1	3.8	16.2	3.5	1.3	0.3		5.1	11.0
E	41.0	0.8			41.8	5.5	14.2	47.4	5.8	.3	67.7	19.6	14.5	32.4	8.1	0.1	55.1	19.4
ESE	10.6				10.6	5.2	6.1	7.4	1.0		14.5	16.2	12.9	10.2	2.4		25.5	15.4
SE	2.7				2.7	4.4	.3	.1			.4	8.3	1.4	.3			1.7	9.0
SSE	.4				.4	3.9	.1				.1	3.9	1.0				1.0	5.6
S	.3				.3	3.2	.3				.3	3.9	.4				.4	3.1
SSW							.4				.4	3.4	.4				.4	4.3
SW	.3				.3	3.5	1.1				1.1	4.6	.6				.6	5.3
WSW	1.6				1.6	7.8	2.5				2.5	7.1	.7	.1			.8	5.1
W	3.6	.1			3.7	7.4	4.0	.3			4.3	7.9	.7				.7	5.8
WNW	3.7				3.7	8.7	1.6	.1			1.7	7.8	.4				.4	5.2
NW	1.8				1.8	7.5	.3				.3	4.5	.1				.1	3.9
NNW	.1				.1	3.2	.3				.3	5.8	.2	.1			.3	12.6
Total, percent	79.1	.9			80.0	5.2	33.7	57.2	6.9	.4	98.2	17.2	40.0	44.5	10.8	.1	95.4	16.1
Percent 0–3 knots	20.0						1.8						4.6					
Number of observations	727						719						711					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

PORT-AU-PRINCE, HAITI—Continued

SUMMER (JUNE–AUGUST)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	0.6		0.2		0.8	12.6	0.8	0.4			1.2	10.3	0.7				0.7	11.7
NNE	.4				.4	5.8	.4				.4	7.8	1.3	1.3	0.7		3.3	15.5
NE	2.7	0.4			3.1	8.6	1.2	.4			1.6	9.3	.7	2.6			3.3	19.0
ENE	12.4	2.7			15.1	10.7	7.0	5.9	0.4		13.3	13.8	7.9	4.0	1.3		13.2	14.1
E	14.9	14.9	2.3		32.1	16.3	15.7	14.0	.4		30.1	14.9	12.5	15.2	.7		28.4	14.9
ESE	15.3	6.4	1.8	0.2	23.7	13.7	17.2	6.6	1.2		25.0	13.3	11.8	9.3			21.1	13.6
SE	8.2	4.2		.2	12.6	12.3	7.6	3.1			10.7	11.6	6.5	2.0			8.5	9.3
SSE	4.2	.8			5.0	9.6	5.0	2.4			7.4	10.4	2.0	.7			2.7	10.0
S	1.2	1.0			2.2	10.9	2.7	.4			3.1	9.2	2.6	.7			3.3	11.3
SSW	1.4				1.4	8.6	1.2	1.2			2.4	9.7	2.7	1.3			4.0	12.6
SW	.6				.6	3.9	1.2	.4			1.6	9.2	2.7				2.7	7.3
WSW													2.0	.7			2.7	10.5
W							.4				.4	9.7	.7				.7	3.9
WNW	.2				.2	3.9							.7				.7	7.8
NW	.4				.4	5.8	.8				.8	7.8	.7				.7	9.7
NNW	.2				.2	3.9							.7				.7	7.8
Total, percent	62.7	30.4	4.3	.4	97.8	13.1	61.2	34.8	2.0		98.0	12.9	56.2	37.8	2.7		96.7	13.2
	Percent 0–3 knots 2.2 Number of observations 510						Percent 0–3 knots 2.0 Number of observations 256						Percent 0–3 knots 3.3 Number of observations 151					

AUTUMN (SEPTEMBER–NOVEMBER)

	Surface (59 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N							0.2				0.2	2.6	0.5				0.5	3.1
NNE	0.6				0.6	3.9							.7	0.2			.9	7.5
NE	3.1				3.1	4.2	1.4	0.2			1.6	7.9	3.3	.9	0.2		4.4	9.1
ENE	8.6				8.6	4.3	8.7	2.9	0.3		11.9	11.7	9.3	1.9	.2		11.4	9.2
E	28.5				28.5	4.2	25.9	28.1	3.4		57.4	15.7	21.6	19.3	2.8		43.7	15.1
ESE	9.7				9.7	4.1	8.4	5.0			13.4	12.1	13.1	6.0			19.1	12.0
SE	4.8				4.8	4.0	.8				.8	3.9	1.7	.2			1.9	7.3
SSE							.3				.3	2.9	.6				.6	5.2
S							.3				.3	3.2	.5				.5	4.7
SSW	.2				.2	5.8							.9				.9	5.2
SW	.3				.3	3.9	.4	.2			.6	8.9	.6	.3			.9	11.1
WSW	.8				.8	6.6	2.0				2.0	6.9	2.9	.2			3.1	7.1
W	4.3				4.3	6.2	3.8	.4			4.2	8.3	1.9				1.9	6.4
WNW	2.8				2.8	6.2	1.1				1.1	5.0	.9				.9	3.9
NW	.9				.9	5.5	.9				.9	4.6	.6				.6	4.3
NNW							.2				.2	7.8	.2				.2	2.9
Total, percent	64.6				64.6	3.4	54.4	36.8	3.7		94.9	13.2	59.3	29.0	3.2		91.5	11.8
Percent 0–3 knots						35.4						5.1						8.5
Number of observations						648						644						635

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

PORT-AU-PRINCE, HAITI—Continued

AUTUMN (SEPTEMBER–NOVEMBER)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	1.8				1.8	5.1	2.2				2.2	7.5	1.8	1.2			3.0	12.4
NNE	2.3	0.6			2.9	8.0	1.5	0.7			2.2	10.7	3.0	.6			3.6	9.4
NE	7.2	.8			8.0	8.3	5.5	1.5			7.0	9.8	6.4	3.0			9.4	10.4
ENE	10.6	4.1			14.7	10.9	7.4	3.7			11.1	12.1	9.5	4.8			14.3	12.4
E	17.0	11.0	0.6	0.2	28.8	13.8	14.1	7.4			21.5	13.1	7.8	7.8			15.6	11.9
ESE	10.8	4.8	.2	.2	16.0	12.0	10.7	5.2			15.9	12.5	4.7	2.4			7.1	11.8
SE	6.2	1.2	.4		7.8	10.3	8.2	2.2			10.4	9.8	7.1	1.2			8.3	9.7
SSE	3.4	.4			3.8	7.1	5.1				5.1	7.6	4.8				4.8	8.0
S	3.1	1.2			4.3	12.0	6.6	.4	0.4		7.4	9.5	4.8	1.2			6.0	11.3
SSW	1.4	.6			2.0	11.4	4.1	1.1			5.2	10.1	5.7				5.7	9.3
SW	.8	.4			1.2	11.6	1.5	.4			1.9	7.2	3.6	1.2			4.8	9.7
WSW	.6	.4	.2		1.2	13.0	1.5	.4	.4		2.3	13.3	2.4				2.4	4.2
W	1.0				1.0	6.1	.7				.7	5.8	1.2	.6			1.8	9.1
WNW	.6				.6	5.8	1.1	.4			1.5	8.2	2.4	.6			3.0	9.3
NW	.6				.6	6.5	1.1				1.1	4.5	1.2				1.2	5.8
NNW	.2				.2	2.9	.4				.4	11.7	2.4				2.4	7.0
Total, percent	67.6	25.5	1.4	.4	94.9	11.1	71.7	23.4	.8		95.9	10.9	68.8	24.6			93.4	10.3
Percent 0–3 knots						5.1						4.1						6.6
Number of observations						512						270						167

WINTER (DECEMBER–FEBRUARY)

	Surface (59 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	0.1				0.1	3.9	0.4				0.4	4.5	0.6				0.6	2.9
NNE	.3				.3	3.9	.1				.1	7.8	.6				.6	7.3
NE	2.3				2.3	4.7	1.3	0.3			1.6	11.6	3.7	1.2	0.3		5.2	10.6
ENE	6.7				6.7	4.5	11.3	8.5			19.8	13.5	14.7	4.9			19.6	11.2
E	24.8				24.8	4.0	21.5	33.2	4.2	0.1	59.0	16.8	25.7	22.0	2.3		50.0	15.0
ESE	16.5				16.5	3.8	4.2	1.8	.4		6.4	14.7	7.4	4.6	.9		12.9	13.8
SE	4.6				4.6	3.9	.3				.3	3.9	.6				.6	4.5
SSE	.7				.7	3.2	.1				.1	2.9	.1				.1	2.9
S	.4				.4	2.9	.3				.3	3.9	.1				.1	5.8
SSW	.1				.1	3.9	.1				.1	3.9	.1				.1	2.6
SW	.1				.1	3.9	.4				.4	5.2	.4				.4	3.9
WSW	.4				.4	5.2	2.5				2.5	6.6	1.5				1.5	4.8
W	5.9				5.9	6.3	6.4	.1			6.5	7.3	2.7	.1			2.8	6.5
WNW	5.1				5.1	7.0	.4				.4	6.5	.3	.1			.4	10.3
NW	1.7				1.7	6.7	.4				.4	4.5	.1				.1	2.9
NNW	.0						.1				.1	9.7						
Total, percent	69.7				69.7	3.7	49.8	43.9	4.6	.1	98.4	14.6	58.6	32.9	3.5		95.0	12.8
Percent 0–3 knots	30.3						1.6						5.0					
Number of observations	688						687						675					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

PORT-AU-PRINCE, HAITI—Continued

WINTER (DECEMBER–FEBRUARY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	2.4				2.4	5.7	3.8				3.8	7.4	0.8	0.8			1.6	15.5
NNE	3.2	0.6			3.8	9.9	5.0	0.8			5.8	9.3	1.5	1.5	0.8		3.8	14.7
NE	8.2	2.1		0.2	10.5	12.0	4.2	3.0			7.2	13.4	3.0	7.3			10.3	15.9
ENE	12.5	4.3	0.2		17.0	12.2	14.2	7.2	1.1		22.5	13.8	7.4	10.4	1.5		19.3	16.5
E	22.5	14.9	1.9		39.3	14.3	12.2	10.6	.8		23.6	14.9	6.0	12.0	2.2		20.2	18.0
ESE	8.0	4.1	.9		13.0	13.8	11.8	7.2	.4		19.4	13.9	6.0	5.2	.8		12.0	14.8
SE	4.1	.6			4.7	9.1	2.3	1.5			3.8	12.6	3.0	2.2			5.2	12.2
SSE	1.9				1.9	7.2	2.6	.4			3.0	10.2	.8				.8	9.7
S	.9				.9	4.4	1.1				1.1	6.5	1.5				1.5	9.7
SSW	.4				.4	8.7	1.5	.4			1.9	9.3	2.2				2.2	5.1
SW	.6				.6	3.9	.8				.8	5.8	3.0				3.0	8.3
WSW	.4				.4	2.9	1.1				1.1	9.7	1.5	.8	1.5		3.8	14.1
W	1.1				1.1	7.2	1.1				1.1	9.7	2.2	.8			3.0	10.7
WNW	.2				.2	9.7	.4				.4	9.7	2.2				2.2	5.8
NW	.6				.6	7.8	1.1				1.1	7.1	2.9	.8			3.7	10.0
NNW	.4				.4	5.8	1.9				1.9	8.1	3.7				3.7	7.8
Total, percent	67.4	26.6	3.0	.2	97.2	12.3	65.1	31.1	2.3		98.5	12.9	47.7	41.8	6.8		96.3	14.2
Percent 0–3 knots						2.8						1.5						3.7
Number of observations						535						263						134

SAN JUAN, PUERTO RICO

SPRING (MARCH–MAY)

	Surface (52 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	0.4				0.4	5.8	0.5				0.5	6.4	0.5				0.5	6.4
NNE	.9	0.3			1.2	10.5	.7	0.3			1.0	11.1	1.0	0.1			1.1	7.9
NE	2.7	1.1			3.8	12.0	2.4	1.1	0.1		3.6	13.7	1.9	.7			2.6	11.6
ENE	7.4	8.4			15.8	14.8	5.5	8.0	.5		14.0	16.6	5.1	4.8	0.1		10.0	14.1
E	13.5	6.9			20.4	11.6	6.9	25.8	.8		33.5	18.3	8.3	18.6	.9		27.8	17.5
ESE	7.9	.1			8.0	5.6	8.6	13.2			21.8	15.7	11.3	14.4	.1		25.8	15.6
SE	12.2	.1			12.3	5.2	8.4	4.8	.2		13.4	13.4	10.0	7.0	.2		17.2	13.8
SSE	11.1				11.1	4.4	1.5	3.2			4.7	15.8	3.2	2.5	.1		5.8	13.4
S	5.5				5.5	3.6	1.2	1.2			2.4	13.6	1.8	.4			2.2	10.2
SSW	2.6				2.6	3.5	.6	.2			.8	9.0	1.7	.2	.1		2.0	11.4
SW	1.2				1.2	4.0	.3				.3	7.8	.8	.1			.9	7.8
WSW	.6				.6	5.2	.3				.3	5.8	.1				.1	7.8
W	.3				.3	5.5	.4	.1			.5	7.8	.2	.1			.3	10.7
WNW	.5				.5	6.8	.8	.1			.9	9.0	.5	.1		0.1	.7	11.0
NW	.5				.5	6.7	.8				.8	7.9	.8				.8	5.8
NNW	.2				.2	7.1	.6				.6	7.6	.6				.6	6.0
Total, percent	67.5	16.9			84.4	8.1	39.5	58.0	1.6		99.1	15.8	47.8	49.0	1.5	.1	98.4	14.8
Percent, 0–3 knots	15.6						0.9						1.6					
Number of observations	1,467						1,467						1,406					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

SAN JUAN, PUERTO RICO—Continued

SPRING (MARCH–MAY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	1.5	0.1			1.6	7.0	3.0	0.4			3.4	7.8	4.0	0.7			4.7	8.9
NNE	3.4	.2			3.6	7.6	4.4	.5			4.9	8.4	5.3	1.4			6.7	9.8
NE	4.5	1.3			5.8	9.9	6.0	1.4	0.1		7.5	10.0	3.1	1.0			4.1	9.3
ENE	7.1	4.6			11.7	12.8	6.0	2.8			8.8	11.6	5.8	1.2	0.2		7.2	11.6
E	10.1	9.6	0.2		19.9	14.4	10.1	4.4	.3		14.8	12.0	7.2	2.4	.2		9.8	11.5
ESE	11.3	7.5	.2		19.0	13.0	8.4	3.3	.1		11.8	11.1	3.3	.2			3.5	9.4
SE	9.1	2.6			11.7	10.6	6.0	1.1			7.1	9.9	2.9	1.6			4.5	10.3
SSE	4.7	1.2			5.9	10.1	5.2	.5			5.7	8.0	3.4	.5	.2		4.1	9.3
S	2.9	.9			3.8	9.7	4.4	.8			5.2	8.7	5.4	1.0			6.4	8.2
SSW	1.8	.5	.1		2.4	9.7	3.5	.4			3.9	9.1	2.9	1.4			4.3	11.1
SW	2.4	.5			2.9	9.7	2.6	1.4	.4		4.4	14.0	7.1	1.7	.3		9.1	11.1
WSW	2.2	.2			2.4	8.4	3.4	1.0	.1		4.5	10.6	6.6	3.4	.3		10.3	12.2
W	.8	.1			.9	7.8	4.2	.5			4.7	8.7	5.1	1.9	.2		7.2	11.8
WNW	1.0	.2		0.1	1.3	10.0	2.6	.3			2.9	7.0	5.5	.5			6.0	8.3
NW	1.6				1.6	6.7	2.4	.1			2.5	7.8	2.9	.2			3.1	7.5
NNW	1.1				1.1	6.0	2.2				2.2	6.7	3.6	.7			4.3	9.9
Total, percent	65.5	29.5	.5	.1	95.6	11.5	74.4	18.9	1.0		94.3	10.0	74.1	19.8	1.4		95.3	10.3
Percent, 0–3 knots					4.4						5.7						4.7	
Number of observations					1,093						790						581	

SUMMER (JUNE-AUGUST)

	Surface (52 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	0.1				0.1	4.9	0.2				0.2	7.4	0.2				0.2	10.4
NNE	.3				.3	8.3	.3				.3	8.6	.4	0.1			.5	11.4
NE	.8	0.4			1.2	11.2	.6	0.3			.9	11.6	.4	.2			.6	13.8
ENE	7.0	6.8			13.8	13.9	2.2	6.9	0.5		9.6	18.6	1.5	4.0	0.1		5.6	17.4
E	21.2	9.9			31.1	11.4	6.8	42.5	1.3		50.6	19.0	4.4	33.4	2.0		39.8	20.2
ESE	13.2	.2			13.4	5.6	6.9	18.5	.4		25.8	17.6	8.0	27.3	1.6	0.1	37.0	19.1
SE	10.1				10.1	4.3	4.4	3.4	.2	0.1	8.1	14.5	4.1	6.9	.3	.1	11.4	16.1
SSE	7.6				7.6	3.9	.7	1.4	.1		2.2	17.0	.9	1.2			2.1	16.3
S	3.4	.1			3.5	3.4	.5	.5			1.0	16.1	.8	.6			1.4	14.2
SSW	.6				.6	3.0	.2	.2			.4	13.3	.3	.2			.5	11.4
SW	.5	.1			.6	4.4	.1				.1	15.5	.1	.2			.3	19.4
WSW	.1				.1	3.9		.1			.1	11.6	.1	.1			.2	11.0
W	.1				.1	9.7	.1	.1			.2	14.5		.1			.1	17.5
WNW	.1				.1	5.8	.1				.1	5.8						
NW	.1				.1	3.9	.1				.1	7.8	.1				.1	4.9
NNW	.1				.1	3.9	.1				.1	5.8	.1				.1	7.8
Total, percent	65.3	17.5			82.8	8.1	23.3	73.9	2.5	.1	99.8	18.0	21.4	74.3	4.0	.2	99.9	18.8
Percent, 0–3 knots	17.2						0.2						0.1					
Number of observations	1,903						1,902						1,843					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

SAN JUAN, PUERTO RICO—Continued

SUMMER (JUNE–AUGUST)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	0.3				0.3	7.8	0.7	0.1			0.8	9.3	1.3	0.1			1.4	8.2
NNE	.3	0.1			.4	10.0	1.2	.3			1.5	10.7	2.8	.1			2.9	8.3
NE	.8	.9			1.7	13.6	2.5	2.1	0.1		4.7	13.1	5.1	1.5	0.1		6.7	10.4
ENE	4.9	5.4	0.5		10.8	15.9	6.3	5.0	.7		12.0	15.2	9.7	4.2			13.9	12.1
E	11.5	23.6	2.1	0.1	37.3	17.9	11.4	13.7	1.2	0.2	26.5	16.1	12.3	8.9	.6		21.8	14.2
ESE	9.0	20.4	2.0		31.4	18.0	12.5	10.8	1.5		24.8	15.4	14.4	6.1	.3		20.8	12.6
SE	4.2	5.7	.5	.1	10.5	16.1	9.5	5.5	.6		15.6	14.1	8.2	2.8	.1		11.1	11.8
SSE	2.5	1.1	.2		3.8	13.1	5.1	2.1	.3		7.5	12.5	5.9	1.1	.1		7.1	11.0
S	1.4	.1			1.5	10.0	1.8				1.8	8.6	2.5	.7			3.2	10.5
SSW	.4	.1			.5	9.4	.7	.3			1.0	9.7	1.6	.4			2.0	8.0
SW	.3	.2			.5	13.0	.9	.2			1.1	8.4	1.2	.6			1.8	9.2
WSW		.1			.1	11.6	.5	.1			.6	11.3	1.8				1.8	8.4
W	.1				.1	12.6	.4	.1			.5	9.1	.4	.2			.6	8.2
WNW	.2	.1			.3	8.7		.1			.1	17.5	.6	.3			.9	7.5
NW	.1				.1	3.9	.1				.1	3.4	.6				.6	4.9
NNW	.1				.1	1.9	.1				.1	4.9	.7				.7	5.4
Total, percent	36.1	57.8	5.3	.2	99.4	16.9	53.7	40.4	4.4	.2	98.7	14.5	69.1	27.0	1.2		97.3	11.8
Percent, 0–3 knots						0.6						1.3						2.7
Number of observations						1,503						1,049						714

Autumn (September–November)

	Surface (52 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	0.5	0.1			0.6	9.2	0.8	0.1			0.9	9.1	1.0	0.1			1.1	7.3
NNE	.7	.4			1.1	10.3	1.5	.4	0.1		2.0	10.5	1.2	.2			1.4	9.5
NE	2.9	1.1			4.0	11.7	3.6	1.5	.1		5.2	12.6	3.6	1.2	0.1		4.9	11.8
ENE	5.4	4.0			9.4	13.3	7.9	6.9	.3		15.1	14.7	6.6	6.7	.3		13.6	14.9
E	12.2	2.7			14.9	10.0	12.6	23.1	.2		35.9	16.4	9.0	20.7	.7		30.4	17.1
ESE	7.6	.1			7.7	5.4	7.8	9.8	.3		17.9	15.5	10.4	11.7	.3		22.4	15.3
SE	11.3	.1			11.4	4.5	6.3	2.8	.1		9.2	12.8	7.0	3.2	.3	0.1	10.6	13.2
SSE	12.8				12.8	4.1	2.8	2.3			5.1	13.8	2.2	1.4	.2	.1	3.9	13.9
S	9.6				9.6	3.6	1.3	1.2	.1		2.6	14.2	2.3	1.3	.1		3.7	12.3
SSW	5.1				5.1	3.5	1.0	.1			1.1	8.7	1.5	.2			1.7	10.1
SW	2.2				2.2	3.5	.8	.1			.9	5.9	1.2	.1			1.3	8.2
WSW	.5				.5	4.6	.4				.4	6.0	.8	.1			.9	8.0
W	.2	.1			.3	6.6	.5	.1			.6	7.8	.6				.6	6.3
WNW	.1				.1	5.8	.6				.6	5.8	.6	.1			.7	7.5
NW	.3				.3	4.2	.5				.5	7.3	.3				.3	6.4
NNW	.7				.7	6.5	.6				.6	8.4	.6				.6	9.5
Total, percent	72.1	8.6			80.7	6.4	49.0	48.4	1.2		98.6	14.5	48.9	47.0	2.0	0.2	98.1	14.5
Percent 0–3 knots						19.3						1.4						1.9
Number of observations						1,877						1,876						1,811

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

SAN JUAN, PUERTO RICO—Continued

AUTUMN (SEPTEMBER–NOVEMBER)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	1.1	0.1			1.2	8.2	2.2				2.2	7.8	3.6	0.1			3.7	7.8
NNE	2.3	.3			2.6	8.4	2.6	0.6			3.2	9.8	2.1	.3			2.4	8.1
NE	3.6	1.4	0.1		5.1	11.3	5.6	1.5			7.1	10.4	6.1	1.1	0.1		7.3	10.6
ENE	7.7	5.1	.1		12.9	13.4	7.1	3.0	0.1		10.2	11.5	8.4	2.7	.1		11.2	11.2
E	13.2	13.2	.4		26.8	14.4	12.1	7.3	.2		19.6	13.7	9.0	2.9	.1		12.0	11.0
ESE	9.6	7.6	.5		17.7	14.3	10.4	3.5	.3		14.2	11.9	8.4	2.7	.2		11.3	11.1
SE	7.7	1.8	.5		10.0	11.4	7.8	1.5	.2	0.1	9.6	10.8	5.9	.9			6.8	9.0
SSE	4.1	.8			4.9	8.8	5.0	.3			5.3	8.4	5.2	.6			5.8	8.4
S	2.8	1.0	.1		3.9	11.1	4.0	.5	.1		4.6	9.4	5.0	.7			5.7	8.8
SSW	2.7	.3			3.0	9.2	4.0	1.1			5.1	10.0	4.0	1.4	.1		5.5	10.8
SW	2.0	.3			2.3	8.8	3.6	.8			4.4	9.4	5.5	1.1			6.6	9.3
WSW	1.7	.2			1.9	7.5	2.4	.3	.1		2.8	10.8	4.2	.9	.1		5.2	10.6
W	1.3	.1			1.4	7.3	1.7	.3			2.0	7.5	4.1	.9			5.0	9.4
WNW	.8	.1			.9	6.5	1.8	.2			2.0	7.3	1.7	.1			1.8	7.8
NW	1.2				1.2	7.2	1.3	.1			1.4	7.8	1.6	.2			1.8	6.8
NNW	.8				.8	6.6	0.9				.9	5.7	1.9	.3			2.2	9.1
Total, percent	62.6	32.3	1.7		96.6	12.3	72.5	21.0	1.0	.1	94.6	10.9	76.7	16.9	0.7		94.3	9.9
	Percent 0–3 knots					3.4	Percent 0–3 knots					5.4	Percent 0–3 knots					5.7
	Number of observations					1,506	Number of observations					1,171	Number of observations					865

Winter (December–February)

	Surface (52 feet)						1,600 feet						3,300 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	1.3	0.5	0.1		1.9	12.9	1.2	0.5	0.1		1.8	13.4	1.7	0.5			2.2	10.4
NNE	1.4	.9	.1		2.4	13.1	2.0	1.0	.1		3.1	13.2	1.8	.7			2.5	11.6
NE	5.7	3.5	.1		9.3	13.6	4.2	3.2	.5		7.9	15.0	4.7	2.5	0.1		7.3	13.8
ENE	9.3	9.4	.1		18.8	14.9	8.4	16.7	1.7		26.8	17.6	8.7	16.6	.6		25.9	17.0
E	12.6	5.8			18.4	12.1	7.6	27.8	1.6		37.0	18.8	7.3	24.0	2.3		33.6	19.4
ESE	7.5	.2			7.7	6.1	5.2	7.0	.1		12.3	15.9	6.5	7.7	.4		14.6	15.8
SE	8.1				8.1	4.7	2.8	1.4			4.2	12.4	4.2	1.8	.1		6.1	12.3
SSE	9.0				9.0	4.1	1.1	.9	.1		2.1	13.4	1.5	.6			2.1	11.3
S	8.3				8.3	3.9	.5	.3			.8	13.4	.6	.4			1.0	11.9
SSW	3.9				3.9	3.7	.3				.3	8.5	.6	.1			.7	7.8
SW	2.1				2.1	3.8	.2				.2	7.8	.8	.1			.9	7.5
WSW	.2				.2	3.5	.3				.3	7.8	.1	.1			.2	8.2
W	.1				.1	5.8	.3				.3	6.5	.3	.1			.4	9.3
WNW	.3	.1			.4	8.1	.5	.1			.6	8.2	.5				.5	7.2
NW	.4	.1			.5	7.5	.5	.1			.6	8.7	.4	.1			.5	10.3
NNW	.2	.1			.3	10.2	.9	.1			1.0	7.5	.4	.1			.5	7.8
Total, percent	70.4	20.6	.4		91.4	9.1	36.0	59.1	4.2		99.3	16.7	40.1	55.4	3.5		99.0	16.3
	Percent 0–3 knots 8.6 Number of observations 1,449						Percent 0–3 knots 0.7 Number of observations 1,448						Percent 0–3 knots 1.0 Number of observations 1,363					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

SAN JUAN, PUERTO RICO—Continued

WINTER (DECEMBER-FEBRUARY)—Continued

	6,600 feet						9,800 feet						13,100 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	2.5	0.4			2.9	8.5	3.1	1.2			4.3	9.7	4.3	1.0			5.3	9.3
NNE	2.7	1.3			4.0	11.5	6.0	1.2			7.2	10.1	5.8	1.2	0.2		7.2	10.6
NE	6.5	3.6			10.1	13.0	6.3	3.8	0.3		10.4	13.8	7.0	5.0	.5		12.5	13.5
ENE	8.6	12.0	0.5		21.1	16.0	7.8	8.4	.5	0.2	16.9	14.9	6.2	3.6			9.8	11.8
E	10.4	15.7	.8		26.9	16.2	12.6	7.5	.3	.2	20.6	13.5	5.3	4.3	1.2	0.2	11.0	16.3
ESE	7.2	6.8	.8		14.8	15.4	6.9	3.7	.5		11.1	13.6	5.8	2.1	.2		8.1	12.8
SE	3.1	1.0	.2		4.3	12.2	3.3	1.5			4.8	10.3	2.9	.5			3.4	10.2
SSE	2.4	.4			2.8	9.7	2.0	.8			2.8	10.2	2.9	.7			3.6	8.7
S	1.1	.1			1.2	8.1	1.8	.5			2.3	9.0	1.9	.5			2.4	9.4
SSW	1.0	.2			1.2	8.8	2.8	.7			3.5	8.8	1.9	.2			2.1	7.4
SW	1.2	.1			1.3	8.5	1.3	.2			1.5	7.2	3.1	1.2			4.3	12.2
WSW	1.4				1.4	8.0	2.8	.5	.3		3.6	10.5	2.9	1.4			4.3	11.4
W	1.5	.1			1.6	8.3	2.3	.8			3.1	9.2	5.5	1.0	.2		6.7	10.7
WNW	1.0	.2			1.2	8.9	1.2	.2			1.4	6.3	3.1	.7			3.8	9.6
NW	1.3	.1			1.4	7.0	1.2	.3			1.5	10.3	3.6	1.4			5.0	11.2
NNW	.8	.2			1.0	8.1	1.6	.2			1.8	6.9	4.3	.7			5.0	8.7
Total, percent	52.7	42.2	2.3		97.2	14.0	63.0	31.5	1.9	.4	96.8	12.1	66.5	25.5	2.3	.2	94.5	11.6
	Percent 0–3 knots 2.8 Number of observations 933						Percent 0–3 knots 3.2 Number of observations 603						Percent 0–3 knots 5.5 Number of observations 418					

PORT-OF-SPAIN, TRINIDAD

SPRING (MARCH-MAY)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	1.2				1.2	4.3	1.2				1.2	3.5						
NNE							.6				.6	13.0						
NE	3.6	0.6			4.2	5.0	6.0	1.8			7.8	11.3	3.9	1.3			5.2	11.9
ENE							12.0	4.9			16.9	11.9	11.5	7.0			18.5	14.0
E	2.4				2.4	4.1	28.4	11.4			39.8	14.7	18.0	19.9			37.9	15.7
ESE	10.1	1.2			11.3	8.9	14.5	11.4			25.9	14.5	14.7	15.4			30.1	15.3
SE	11.9	1.2			13.1	7.4	4.8				4.8	7.4	3.2	1.9			5.1	13.4
SSE							.6				.6	4.3	1.3				1.3	10.8
S	2.4				2.4	6.3												
SSW																		
SW	.6				.6	3.0												
WSW	.6				.6	3.5												
W	2.4				2.4	3.3												
WNW	.6				.6	6.1												
NW																		
NNW																		
Total, percent	35.8	3.0			38.8	3.4	68.1	29.5			97.6	13.1	52.6	45.5			98.1	14.6
Percent 0–3 knots	61.2						2.4						1.9					
Number of observations	168						166						156					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

PORT-OF-SPAIN, TRINIDAD—Continued

SPRING (MARCH–MAY)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N																		
NNE	1.8	0.9			2.7	11.0	3.5				3.5	9.6	8.3				8.3	12.2
NE	3.6	.9			4.5	10.4	6.9	1.7			8.6	10.6	16.7				16.7	10.0
ENE	4.5	5 4.			9.9	14.7	13.8				13.8	8.7		8.3			8.3	23.0
E	24.4	5.4			29.8	13.2	8.6	10.3	1.7		20.6	15.1	8.3	8.4			16.7	14.8
ESE	18.9	14.4	1.8		35.1	15.1	8.6	10.3			18.9	14.4	8.4	8.3			16.7	17.4
SE	4.5	2.7	.9		8.1	13.5	3.4	3.5			6.9	13.0	8.4				8.4	8.7
SSE	1.8	.9			2.7	11.6	1.7		1.7		3.4	20.4						
S	.9				.9	6.9	1.7				1.7	5.6	8.3				8.3	4.3
SSW	.9				.9	5.2	5.2				5.2	5.8						
SW							1.7				1.7	14.8	8.3				8.3	11.3
WSW													8.3				8.3	4.3
W	.9				.9	8.7												
WNW	.9				.9	6.1	3.5				3.5	8.2						
NW	.9				.9	6.9	5.2				5.2	7.8						
NNW							3.5				3.5	7.8						
Total, percent	64.0	30.6	2.7		97.3	13.5	67.3	25.8	3.4		96.5	11.9	75.0	25.0			100.0	12.3
	Percent 0–3 knots 2.7 Number of observations 111						Percent 0–3 knots 3.5 Number of observations 58						Percent 0–3 knots 0 Number of observations 12					

SUMMER (JUNE-AUGUST)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	1.8				1.8	1.9	1.2				1.2	5.2						
NNE	.6				.6	5.6							0.6				0.6	6.9
NE	1.2				1.2	2.4	3.1	0.6			3.7	9.7	1.3				1.3	6.9
ENE	.6				.6	2.2	12.2	3.1			15.3	11.4	11.3	7.6			18.9	14.3
E	2.4				2.4	3.8	28.6	7.4			36.0	11.8	19.5	17.6	0.6		37.7	14.9
ESE	9.8	0.6			10.4	8.0	17.1	12.8			29.9	13.8	17.6	10.7	.6		28.9	15.0
SE	4.9				4.9	4.9	6.7	1.8			8.5	9.7	5.0	3.8			8.8	14.7
SSE	.6				.6	3.5	.6				.6	13.0	2.5				2.5	9.4
S							1.8				1.8	6.9	.7				.7	12.1
SSW																		
SW	1.9				1.9	3.8												
WSW																		
W							.6				.6	3.5						
WNW																		
NW	.6				.6	2.6												
NNW	.6				.6	3.9	.6				.6	3.5						
Total, percent	25.0	.6			25.6	2.2	72.5	25.7			98.2	11.7	58.5	39.7	1.2		99.4	14.3
Percent 0–3 knots	74.4						1.8						0.6					
Number of observations	164						164						159					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

PORT-OF-SPAIN, TRINIDAD—Continued

SUMMER (JUNE-AUGUST)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N																		
NNE																		
NE	0.8				0.8	7.0								2.8			2.8	20.8
ENE	2.5	2.5			5.0	14.5	3.8	9.0			12.8	17.2	5.6	5.6			11.2	12.8
E	17.7	28.5	4.2		50.4	18.5	14.1	24.4	2.6		41.1	16.8	13.9	19.4			33.3	15.2
ESE	16.8	9.3	1.7		27.8	15.5	20.5	11.5	1.3		33.3	14.6	33.3	8.3			41.6	12.8
SE	7.6	.8			8.4	10.1	6.4				6.4	9.6	5.5				5.5	6.1
SSE	4.2	1.7			5.9	11.1	6.4				6.4	7.3						
S	1.7				1.7	10.0							2.8				2.8	5.2
SSW																		
SW																		
WSW																		
W																		
WNW																		
NW																		
NNW																		
Total, percent	51.3	42.8	5.9		100.0	16.1	51.2	44.9	3.9		100.0	15.0	61.1	36.1			97.2	13.3
	Percent 0–3 knots 0 Number of observations 119						Percent 0–3 knots 0 Number of observations 78						Percent 0–3 knots 2.8 Number of observations 36					

AUTUMN (SEPTEMBER–NOVEMBER)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	0.8				0.8	2.9												
NNE							0.8				0.8	4.3						
NE							.9				.9	3.0	0.9				0.9	7.8
ENE							9.3	1.7			11.0	10.0	3.8	5.6			9.4	15.5
E	2.5				2.5	5.0	26.3	3.4			29.7	9.7	20.8	9.4			30.2	12.7
ESE	11.8				11.8	6.2	21.2	15.2			36.4	13.7	18.9	12.3			31.2	14.6
SE	12.6	0.9			13.5	7.2	9.3	4.3			13.6	13.8	12.3	6.6			18.9	13.4
SSE							1.7				1.7	12.2	2.8				2.8	10.2
S	2.5				2.5	8.3							2.8				2.8	11.3
SSW	.9				.9	3.5	.8				.8	3.5						
SW	2.5				2.5	3.0												
WSW																		
W																		
WNW																		
NW	1.7				1.7	3.5												
NNW																		
Total, percent	35.3	.9			36.2	2.6	70.3	24.6			94.9	11.4	62.3	33.9			96.2	13.3
Percent 0–3 knots	63.8						5.1						3.8					
Number of observations	119						118						106					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

PORT-OF-SPAIN, TRINIDAD—Continued

AUTUMN (SEPTEMBER–NOVEMBER)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N																		
NNE							3.3				3.3	3.9						
NE	1.1	1.1			2.2	14.8							3.1				3.1	4.3
ENE	8.9	2.2			11.1	10.4	16.4	3.3			19.7	13.0	3.1	3.1			6.2	13.9
E	16.7	11.1	1.1		28.9	14.0	14.7	6.6			21.3	11.9	15.6	3.1			18.7	11.4
ESE	22.2	6.7			28.9	12.0	23.0	4.8			27.8	11.2	15.6	3.1			18.7	9.4
SE	7.8			1.1	8.9	14.3	11.5	3.3			14.8	10.7	21.9	6.3			28.2	9.1
SSE	8.9				8.9	10.4	3.3				3.3	6.5	6.3	6.3			12.6	15.8
S	4.5				4.5	11.5	1.7				1.7	4.3	6.3				6.3	7.8
SSW	1.1				1.1	6.9	1.6				1.6	13.0						
SW							1.6				1.6	4.3	3.1				3.1	7.8
WSW	1.1				1.1	12.2	1.6				1.6	7.8	3.1				3.1	4.3
W																		
WNW	1.1				1.1	5.2												
NW																		
NNW																		
Total, percent	73.4	21.1	1.1	1.1	96.7	12.3	78.7	18.0			96.7	10.8	78.1	21.9			100.0	10.3
Percent 0–3 knots						3.3						3.3						0
Number of observations						90						61						32

Winter (December-February)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	1.6				1.6	4.7	0.8				0.8	3.5						
NNE		0.8			.8	10.0	3.2				3.2	11.3	3.4	0.8			4.2	11.6
NE	4.7				4.7	3.5	4.0	1.6			5.6	11.5	5.9	1.7			7.6	10.6
ENE	.8				.8	6.1	24.8	4.8			29.6	11.8	10.1	12.6			22.7	14.4
E	2.4				2.4	2.7	35.2	5.6			40.8	11.5	24.4	25.2			49.6	14.7
ESE	4.0	1.6			5.6	10.7	5.6	4.8			10.4	12.9	8.4	4.2			12.6	13.0
SE	7.9				7.9	9.7	3.2	.8			4.0	8.9	1.7				1.7	6.8
SSE																		
S							.8				.8	4.3						
SSW																		
SW	.8				.8	3.9												
WSW																		
W	1.6				1.6	5.6												
WNW																		
NW	.8				.8	4.3	.8				.8	8.7	.8				.8	10.4
NNW							.8				.8	13.9						
Total, percent	24.6	2.4			27.0	2.8	79.2	17.6			96 8	11.3	54.7	44.5			99.2	13.8
Percent 0–3 knots	73.0						3.2						0.8					
Number of observations	126						125						119					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

PORT-OF-SPAIN, TRINIDAD—Continued

WINTER (DECEMBER–FEBRUARY)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N							2.0	2.1			4.1	10.5						
NNE	1.1				1.1	4.3	4.1				4.1	6.1	20.0				20.0	10.2
NE	5.7	3.5			9.2	14.1	6.1				6.1	11.5	6.7				6.7	10.5
ENE	20.7	12.6			33.3	14.2	8.2	4.1			12.3	14.8	20.0	6.6			26.6	11.7
E	11.5	13.8			25.3	15.1	16.3	6.1			22.4	11.3	6.7	13.3			20.0	13.6
ESE	11.5	8.0			19.5	13.7	8.2	2.0			10.2	14.1						
SE	2.3	1.2			3.5	13.9	6.1	6.1			12.2	13.8						
SSE	2.3				2.3	10.0	2.1				2.1	6.1						
S							6.1				6.1	5.2						
SSW							2.1				2.1	4.3						
SW	1.1				1.1	13.9		2.0			2.0	9.1	6.7				6.7	4.3
WSW													13.3				13.3	8.7
W							4.1				4.1	11.8						
WNW	3.5				3.5	10.4												
NW							6.1				6.1	7.6						
NNW																		
Total, percent	59.7	39.1			98.8	13.9	71.5	22.4			93.9	11.0	73.4	19.9			93.3	10.2
	Percent 0–3 knots					1.2	Percent 0–3 knots					6.1	Percent 0–3 knots					6.7
	Number of observations					87	Number of observations					49	Number of observations					15

BARRANQUILLA, COLOMBIA

SPRING (MARCH–MAY)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	5.6				5.6	7.8	3.8				3.8	6.8	3.8				3.8	5.9
NNE	.9				.9	7.0	7.5				7.5	7.7	2.8				2.8	6.5
NE	13.1	2.8			15.9	11.4	9.4	1.9			11.3	10.2	6.6	0.9			7.5	9.1
ENE	33.7	8.4			42.1	11.3	16.1		0.9		17.0	9.6	3.8				3.8	8.3
E	14.1				14.1	5.5	16.1				16.1	7.2	7.5				7.5	5.5
ESE	1.9				1.9	5.7	3.8				3.8	7.4	3.8				3.8	4.6
SE	7.5				7.5	5.7	3.8				3.8	4.8	8.5				8.5	4.6
SSE	4.7				4.7	5.6	4.7				4.7	7.2	6.6				6.6	6.5
S	3.7				3.7	6.7	6.6	1.9			8.5	6.6	17.0	1.0			18.0	9.1
SSW	.9				.9	4.3	3.8				3.8	6.5	6.6				6.6	7.3
SW	.9				.9	6.1	.9				.9	6.1	4.7	1.0			5.7	6.7
WSW							.9				.9	9.6	2.8				2.8	3.2
W							.9				.9	3.5	.9				.9	7.0
WNW							.9				.9	7.0	.9				.9	4.8
NW													1.9				1.9	4.3
NNW	.9				.9	7.0	3.8				3.8	5.2						
Total, percent	87.9	11.2			99.1	9.0	83.0	3.8	.9		87.7	7.6	78.2	2.9			81.1	6.5
Percent 0–3 knots	0.9						12.3						18.9					
Number of observations	107						106						106					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

BARRANQUILLA, COLOMBIA—Continued

SPRING (MARCH–MAY)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N																		
NNE	2.3				2.3	4.8	2.0				2.0	10.4						
NE	1.1				1.1	2.6							2.6				2.6	7.8
ENE	1.1				1.1	4.8	2.1	2.0			4.1	10.1	2.6				2.6	3.5
E	3.4				3.4	3.4	8.2				8.2	6.1	21.1	5.3			26.4	10.0
ESE	1.1				1.1	3.9	6.2	2.0			8.2	7.1	15.8	2.7			18.5	11.1
SE	8.0	1.1			9.1	7.2	10.2				10.2	5.4	2.6				2.6	9.6
SSE	14.8				14.8	5.4	16.4	2.0			18.4	7.5	21.1	2.6			23.7	7.2
S	6.8				6.8	5.1	10.2				10.2	5.3	5.3				5.3	5.6
SSW	10.2				10.2	5.3	4.1				4.1	7.0	2.6				2.6	3.9
SW	4.6				4.6	5.4							2.6				2.6	12.2
WSW	4.6				4.6	3.8	2.0				2.0	3.5	2.6				2.6	4.8
W	2.3				2.3	3.5	2.0				2.0	3.9						
WNW	2.3				2.3	3.8							2.6				2.6	3.5
NW	1.1				1.1	3.5	2.0				2.0	5.2						
NNW																		
Total, percent	63.7	1.1			64.8	4.8	65.4	6.0			71.4	6.2	81.5	10.6			92.1	8.3
Percent 0–3 knots	35.2						28.6						7.9					
Number of observations	88						49						38					

Summer (June–August)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	5.8	0.7			6.5	7.7	2.6				2.6	5.0	1.3				1.3	4.6
NNE	5.8				5.8	8.4	3.9				3.9	5.9	3.9				3.9	5.8
NE	16.1				16.1	8.8	8.4				8.4	7.0	.6				.6	4.3
ENE	16.8	.6			17.4	8.4	11.0	0.6			11.6	7.2	2.6				2.6	8.3
E	9.1				9.1	7.5	6.4				6.4	5.5	4.5				4.5	4.3
ESE	2.6				2.6	3.7	12.3	1.3			13.6	8.9	2.6	0.7			3.3	8.5
SE	11.6				11.6	5.5	9.0	1.3			10.3	7.7	3.9	.7			1.6	6.5
SSE	6.5				6.5	5.9	7.1	.6			7.7	6.8	7.1	.7			7.8	8.0
S	12.9				12.9	5.8	5.2	2.6			7.8	10.6	13.0	2.0			15.0	8.4
SSW	1.9				1.9	4.1	6.4	1.3			7.7	8.0	14.3		0.7		15.0	8.1
SW	1.3				1.3	10.0	1.3				1.3	4.1	7.8	.6			8.4	5.1
WSW							3.9				3.9	7.3	8.4				8.4	5.3
W							1.3				1.3	4.3	3.9				3.9	6.2
WNW													1.9				1.9	8.1
NW	.6				.6	5.2	.6				.6	2.6	.6				.6	7.8
NNW													1.3				1.3	2.9
Total, percent	91.0	1.3			92.3	6.9	79.4	7.7			87.1	7.3	77.7	4.7	.7		83.1	6.9
Percent 0–3 knots	7.7						12.9						16.9					
Number of observations	155						155						154					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

BARRANQUILLA, COLOMBIA—Continued

SUMMER (JUNE–AUGUST)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity	4–14	15–28	29–41	Over 41	Total, percent	Average velocity
N	4.1				4.1	5.1	5.5				5.5	5.2						
NNE	3.3				3.3	6.5	1.8				1.8	7.8						
NE	2.5				2.5	5.4	5.5				5.5	8.1						
ENE	1.7				1.7	3.5	3.6				3.6	5.7	5.1				5.1	10.0
E	5.8		0.8		6.6	7.6	9.1				9.1	8.3	12.8				12.8	8.2
ESE	7.4				7.4	5.5	12.7				12.7	6.0	15.4				15.4	7.2
SE	3.3	0.8			4.1	7.9	20.0				20.0	6.5	30.8		2.6		33.4	9.2
SSE	6.6				6.6	7.0	10.9	3.7			14.6	8.8	17.9	2.6			20.5	10.0
S	11.6				11.6	7.8	9.1				9.1	9.0	2.5				2.5	12.2
SSW	6.6	1.7			8.3	6.6	1.8				1.8	7.4						
SW	7.4				7.4	5.4	3.6				3.6	4.9						
WSW	.8				.8	10.4												
W	2.5				2.5	4.1												
WNW	.8				.8	3.5	1.8				1.8	7.0						
NW	2.5				2.5	6.4												
NNW									1.8		1.8	29.6	2.6		2.6		2.6	34.8
Total, percent	66.9	2.5	.8		70.2	6.1	85.4	3.7	1.8		90.9	7.6	87.1	2.6	5.2		94.9	9.6
																	2.6	6.1
	Percent 0–3 knots					29.8	Percent 0–3 knots					9.1	Percent 0–3 knots					5.1
	Number of observations					121	Number of observations					55	Number of observations					39

AUTUMN (SEPTEMBER-NOVEMBER)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	9.4				9.4	7.7	3.1				3.1	6.8	1.3				1.3	7.0
NNE	6.9				6.9	6.9	5.0				5.0	5.4	2.5				2.5	4.5
NE	5.6	1.3			6.9	7.9	2.5				2.5	5.9	2.5	0.6			3.1	7.0
ENE	4.4				4.4	5.6	6.3	0.6	0.6		7.5	9.4	5.7				5.7	10.3
E	5.6				5.6	5.7	7.5				7.5	10.1	3.1				3.1	5.5
ESE	6.3				6.3	5.6	5.7				5.7	7.4	7.0	0.6			7.6	8.4
SE	14.4				14.4	6.5	8.8	0.6			9.4	7.1	6.3	0.6			6.9	7.4
SSE	7.5				7.5	6.0	8.8				8.8	7.3	7.0	0.6			7.6	7.1
S	11.9				11.9	5.5	7.5	0.6			8.1	8.8	8.2	1.9			10.1	9.3
SSW	8.7				8.7	7.0	10.0	0.6			10.6	8.1	9.4	1.3			10.7	7.4
SW	4.4				4.4	6.1	6.2	1.9			8.1	11.9	8.8				8.8	6.1
WSW	1.2				1.2	4.8	2.5	0.6			3.1	9.3	6.3	0.6			6.9	6.9
W	0.6				0.6	3.5	2.5	0.6			3.1	7.5	4.4	0.6			5.0	7.0
WNW							2.5				2.5	5.2	1.9	0.6			2.5	5.9
NW	0.6				0.6	3.5	2.5				2.5	4.3	1.9				1.9	5.6
NNW	2.5				2.5	8.0	1.9				1.9	4.3	1.2				1.2	3.8
Total, percent	90.0	1.3			91.3	6.3	83.3	5.5	0.6		89.4	7.9	77.5	7.4			84.9	7.2
Percent 0–3 knots						8.7						10.6						15.1
Number of observations						160						160						159

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

BARRANQUILLA, COLOMBIA—Continued

AUTUMN (SEPTEMBER–NOVEMBER)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	2.1				2.1	5.9	3.2				3.2	5.2	4.8				4.8	5.2
NNE																		
NE	1.0				1.0	3.0	6.5				6.5	3.8	4.8				4.8	7.0
ENE	4.2				4.2	9.4	9.7				9.7	10.7						
E	4.2				4.2	4.3	6.5	3.2			9.7	10.4	14.3	4.7			19.0	7.2
ESE	4.2				4.2	5.0	6.4				6.4	8.3	14.3				14.3	6.7
SE	4.2				4.2	5.5	6.4				6.4	7.0	9.5				9.5	12.2
SSE	13.6	1.0			14.6	8.9	16.1				16.1	4.9	19.0				19.0	5.4
S	7.3				7.3	4.6	12.9				12.9	5.2	9.5				9.5	5.2
SSW	10.4	1.0			11.4	8.2	6.5				6.5	3.8	4.8	4.7			9.5	14.8
SW	10.4				10.4	6.8	6.5				6.5	6.1	4.8				4.8	11.3
WSW	6.3				6.3	6.6	3.2				3.2	4.3						
W	3.1	1.0			4.1	8.9												
WNW	3.1				3.1	4.2												
NW	3.1				3.1	3.9												
NNW																		
Total, percent	77.2	3.0			80.2	6.5	83.9	3.2			87.1	6.3	85.8	9.4			95.2	7.8
	Percent 0–3 knots					19.8	Percent 0–3 knots					12.9	Percent 0–3 knots					4.8
	Number of observations					96	Number of observations					31	Number of observations					21

WINTER (DECEMBER–FEBRUARY)

	Surface (10 feet)						2,000 feet						3,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	1.0				1.0	3.5	2.9				2.9	6.1	1.0				1.0	5.2
NNE	1.0				1.0	13.0	3.9				3.9	6.7	3.9				3.9	5.2
NE	17.3	8.7			26.0	13.0	13.6	2.9			16.5	9.7	3.9				3.9	7.7
ENE	32.7	14.4	0.9		48.0	11.9	13.6	7.8	1.0	0.9	23.3	14.3	4.9	3.9	2.0		10.8	16.7
E	16.3	1.0			17.3	6.7	16.5	2.0			18.5	8.3	8.8				8.8	6.5
ESE	1.0				1.0	3.5	11.6				11.6	7.1	6.9				6.9	6.3
SE	3.8				3.8	7.0	7.8	.9			8.7	7.0	4.9				4.9	6.6
SSE							1.0				1.0	10.4	8.8	1.0			9.8	7.9
S	1.0				1.0	5.2	3.9				3.9	8.9	8.8				8.8	7.2
SSW													4.9				4.9	5.9
SW							1.0				1.0	4.3	3.0				3.0	5.6
WSW													2.9				2.9	4.6
W	.9				.9	3.5							5.9				5.9	4.5
WNW													4.9				4.9	4.1
NW													3.9				3.9	6.7
NNW													1.0				1.0	3.5
Total, percent	75.0	24.1	.9		100.0	10.8	75.8	13.6	1.0	.9	91.3	9.6	78.4	4.9	2.0		85.3	7.5
Percent 0–3 knots	0						8.7						14.7					
Number of observations	104						103						102					

TABLE 4.—*Percentage frequency of winds from each direction and for different velocity groups, also average velocity (in knots) for each direction*—Con.

BARRANQUILLA, COLOMBIA—Continued

WINTER (DECEMBER-FEBRUARY)—Continued

	6,000 feet						10,000 feet						12,000 feet					
	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity	4–14	15–28	29–41	Over 41	Total percent	Average velocity
N	1.1				1.1	3.5	1.5				1.5	9.6	2.3				2.3	7.8
NNE							5.9				5.9	7.0	2.3				2.3	7.0
NE	2.1	1.1			3.2	7.2	4.4	1.5			5.9	11.1						
ENE	2.1	1.1			3.2	9.6	2.9		1.5		4.4	10.4	2.3				2.3	6.5
E	10.6		1.1		11.7	8.3	14.7	2.9			17.6	10.6	13.6	6.8			20.4	10.0
ESE	2.1				2.1	5.2	5.9		1.5		7.4	12.9	13.6				13.6	5.2
SE	8.5				8.5	5.8	7.4				7.4	5.5	4.5				4.5	7.8
SSE	11.7				11.7	6.2	10.3	1.5			11.8	8.1	13.7				13.7	8.3
S	7.4				7.4	6.6	7.3				7.3	7.3	6.8				6.8	4.6
SSW	7.4				7.4	5.2	1.5				1.5	4.3	2.3				2.3	5.2
SW	6.4				6.4	6.2	2.9				2.9	4.3	2.3				2.3	7.8
WSW	4.3				4.3	5.2	4.4				4.4	8.7	6.8				6.8	10.4
W	3.2				3.2	4.9	2.9				2.9	9.6						
WNW							1.5				1.5	5.2	2.3				2.3	3.5
NW	2.1				2.1	6.1							4.5				4.5	9.1
NNW	3.2				3.2	3.1												
Total, percent	72.2	2.2	1.1		75.5	6.1	73.5	5.9	3.0		82.4	8.6	77.3	6.8			84.1	7.5
Percent 0–3 knots	24.5						17.6						15.9					
Number of observations	94						68						44					

Bermuda.—The average temperature of the Bermudas is somewhat lower and the annual range somewhat greater than that of the islands of the Bahama and Antilles groups. The mean monthly temperatures range from 80° in August to 63° in February, or about 17° as compared with annual ranges of 10° at Habana, Cuba, and 5° at Bridgetown, Barbados.

In winter the night temperatures as an average fall a little below 60° with an occasional extreme low temperature between 40° and 50°. On the whole the weather in winter is mild and agreeable.

The warm season begins in June with day temperatures usually rising to about 80°. From July to October the temperature is occasionally above 90°, but frequently falls to about 70° or slightly below. The humidity is as a rule relatively high, with the mean for the day between 70 and 80 percent. Hence the weather is at times sultry and oppressive.

The average rainfall is nearly 58 inches, well distributed throughout the year. October has been the wettest month as an average, with about 6 inches. April, with about 4 inches, is driest. Dry weather, sometimes persisting for periods of two to five months, has occurred at all seasons but rather rarely in autumn.

The Bermudas are situated near the western extremity of the Azores "high" where the winds are mostly from the southwest. Northwesterly to northeasterly winds are also common in winter and southerly and southeasterly winds in summer. The average velocity is about 12 knots in late autumn, winter, and early spring with extreme wind velocities of 40 to 60 knots. During the warmer season winds exceeding 28 to 30 knots are rare except in connection with tropical storms.

Many hurricanes pass over the neighboring waters. About one a year, as an average, passes near enough to affect wind and weather conditions in the Bermudas. It is seldom that the center crosses the islands or moves near enough to be destructive. The hurricane of September 21, 1922, was one of the most severe in recent years; on that occasion the barometer fell to 28.57 inches and the highest wind was 86 knots.

During late autumn, winter, and spring extra-tropical disturbances pass eastward or northeastward near to or to the westward of Bermuda; heavy squalls sometimes attend these disturbances, chiefly with shifts of wind to westerly or northerly with the passage of cold fronts.

Florida Keys and Straits.—East winds prevail, except in late autumn and winter when northeast winds predominate. The winds are less dependable than in the West Indies. There is considerable frequency of northerly and southeasterly winds, the former occurring chiefly in the cooler months, the latter in summer. Temperatures are

consequently high, except occasionally when northers occur, during the period from late autumn to early spring. Heavy northers reach the Straits when a strong cyclone is off the east coast of Florida, Georgia, or South Carolina and intense anticyclonic conditions occur in the Southern Plains and West Gulf States and extend eastward. A pressure gradient amounting to an inch of mercury, or more, between the centers of the cyclone and anticyclone, is usually necessary to produce strong northerly winds in the Straits.

Southeasterly gales occur at intervals in winter as cyclonic storms approach from the west or northwest. The shift of wind is nearly always from east to south and to west as the center of the depression passes. Northerly winds follow when there is sufficient anticyclonic development in the rear of the cyclone.

With the exception of these features of winter, there is little change in the weather at any season unless a tropical storm approaches.

Hurricanes of July, August, and early September nearly always come from the eastward or southeastward. Later in September and in October and November a hurricane occasionally comes from the western Caribbean on a northerly to northeasterly course. Some of these storms have been very severe. Particularly violent storms occurred in September of 1919 and 1935. Path of the "Labor Day storm" of 1935 is shown in figure 7 on page 31.

Bahamas.—The climate of the Bahama Islands is subtropical. In the southeastern part of the group the Atlantic high-pressure belt to the north and east is the dominating influence. In the northwestern islands, the anticyclonic influence from the North American continent is felt in winter.

The weather records of Nassau are typical of the northwestern region, and Grand Turk records are representative of the southeastern region.

The mean annual temperature in the northwest is slightly lower and the annual range slightly greater than in the southeast; 77° and 11° at Nassau and 79° and 9° at Grand Turk, respectively. During the warm season, June to October, the temperatures are about the same throughout the group, with day temperatures reaching 85° to 89° and night temperatures between 75° and 80°. The temperature occasionally rises above 90° but has never been above 94° in the period of record. The relative humidity is 70 to 75 percent.

In winter the northwestern group of islands is somewhat cooler than the southeastern group. The coolest month (January) averages 71° at Nassau and 75° at Grand Turk (February).

In the southeastern group the temperature has risen to 90° or above in all months except February and March. The lowest winter temperature of record was 51° at Nassau and 60° at Grand Turk. Relative humidity is slightly higher in winter.

In the southeastern group, the prevailing wind is easterly throughout the year. It is slightly south of east in summer. In the northwestern group the winds are chiefly east and southeast in the warm season and northeast and east in cooler months.

Rainfall is plentiful at all seasons, as a rule, although there is on the average less rain in winter and early spring than during the remainder of the year. December is the driest month at Nassau with 1.40 inches and March is driest at Grand Turk with 1.11 inches. The wettest months are September at Nassau (7.54 inches) and November at Grand Turk (4.51 inches).

The Bahamas lie in the paths of hurricanes that come from the western Caribbean as well as the Atlantic. The latter approach from the east usually in August or September. They occasionally pass north of the Antilles on a west-northwestward course in which case they are quite likely to pass over some of the Bahamas Islands. Occasionally toward the end of September, more often in October, and sometimes in November, the hurricanes of the western Caribbean move to the northward, then northeastward and cross Cuba or the eastern Gulf and extreme southern Florida. On that course they pass through the Bahamas. An example of the Atlantic hurricanes in the Bahamas is that of September 1932. It was of great destructive force at Green Turtle Cay near the point of recurve. The hurricane of October 1926 came from the western Caribbean, and was violent in the Bahamas. The paths of these two hurricanes are shown in figure 7 on page 31.

Cuba.—The island of Cuba lies wholly within the tropics. Although it is under the influence of the anticyclonic weather of North America at times during the winter season, the lowest temperatures of record range from about 50° on the north coast to about 55° in places on the southern coast. In the interior and at higher elevations the temperature has been a few degrees lower. These low temperatures accompany north winds or "los nortes," which blow from well-developed anticyclones and cold weather over the United States.

In the warm season the highest temperatures of the day at Cuban stations range from about 86° to 90° with lowest temperatures at night usually between 70° and 75°. The humidity is about 75 percent of saturation, as an approximate 24-hour average, ranging from about 85 to 90 percent at sunrise and from approximately 60 to 65 percent at the warmest time of day.

The prevailing winds are from the northeast and east in late autumn, winter, and early spring and east to southeast during the remainder of the year, although there is much local variation. Southerly winds are not uncommon in spring and summer along the south coast.

The winds are somewhat stronger in the cooler months. At Habana and Cienfuegos the wind averages about 6 to 8 knots in winter and spring months and 4 to 6 knots in summer and autumn. There are

pronounced daily variations which depend upon local conditions. At Habana the wind at 1400 averages 11.4 knots and at 0400, 4.3 knots.

These seasonal variations of the prevailing winds are partially responsible for the rather marked differences in distribution of rainfall over the island in winter and summer. For the island as a whole, late autumn, winter, and early spring months are relatively dry. During the warmer months rainfall is abundant and dependable in nearly all parts of the island. The southern portion of the western end of Cuba shows the most pronounced variation with average amounts from 6 to 11 inches in the warm season and from 1 to 2 inches in late autumn, winter, and early spring. In the northern portion of extreme eastern Cuba, the seasonal variation is nearly the reverse.

Fog is uncommon, being recorded only about 1 to 2 days a month in late winter and early spring and rarely during other months.

Many of the hurricanes of the West Indies pass near enough to Cuba to affect the weather; the majority cause rain without any serious wind damage. The western portion of the island lies in the normal path of late September and October hurricanes that originate in the western Caribbean Sea.

Hurricanes approaching from the Atlantic usually pass to the south or north of but not directly across Cuba, probably because of the fact that storms on a westward course do not readily cross the island of Haiti without losing considerable energy. Near the end of August or during the first half of September an occasional hurricane moves westward through the southern Bahamas and turns southwestward along the north coast of Cuba, maintaining marked intensity. The hurricane of September 1888 is an outstanding example.

The climate of the Isla de Pinos does not differ much from that of the southern coast of western Cuba. However, this island and the extreme western tip of Cuba have been devastated by hurricanes moving on a westerly course, south of Cuba toward the Yucatan Channel.

Jamaica.—The climate of Jamaica, especially in respect to temperature, rainfall, and local winds, is considerably influenced by topography. Although the island is relatively small, it has much elevated land which rises gradually from all sides. The highest peak is in the Blue Mountains in eastern Jamaica; elevation 7,360 feet.

At sea level the mean annual temperature, as represented by the records at Kingston, Morant Point, and Negril Point, is about 79°. The coolest month is February, 76°, and the warmest August, 82°. The temperature has been above 90° in all months although such temperatures are uncommon in winter and early spring. The highest temperature of record at Kingston was 97° in August.

In winter the temperature does not frequently fall as low as 65°. The usual low temperature at night in summer is between 70° and 76°. At Kingston the lowest of record was 57° in each of the winter months.

The humidity is high. At Kingston, the average for the year is about 75 percent of saturation. It ranges between 75 and 80 percent in autumn and early winter. Combined with the high temperatures, this condition is oppressive when wind movement is light.

At higher elevations it is much cooler. At Hill Gardens (about 5,000 feet elevation) the mean annual temperature is 62°.

Jamaica lies in an area where the prevailing winds (trades) are northeast to east throughout the year, but with a considerable frequency of southeast winds in summer and autumn. Along the shores of the island there are distinct diurnal variations. At Kingston the winds are about equally divided between southeasterly and north-northeasterly. The wind is strongest in early afternoon, 6 to 8 knots, and weakest just before sunrise, about 2 knots.

Rainfall is relatively light in the lee of the mountains but abundant elsewhere. On the windward slopes of the mountains rains are frequently heavy to torrential. The winter and early spring months, as a rule, have less rain. There is diminished rain in midsummer. Wet periods come in May or June and again in autumn. Some heavy rains of the latter season accompany tropical storms.

West Indian hurricanes pass in the vicinity of Jamaica on the average about once in 2 years but the majority cause little more than heavy rain and fresh to strong winds. An occasional hurricane from the Atlantic, on a westward course, is destructive there. The island lies a little to the eastward of the most frequented paths of western Caribbean storms. The great hurricane of November 1912 moved slowly and was very destructive. The path of this hurricane is shown in figure 7 on page 31.

Hispaniola.—The island is of sufficient size to modify the tropical marine climate normal in that part of the West Indies. The range of temperatures is increased and the amount of rainfall is greatly affected by the topography of the island.

The trade winds bring to the north coast more nearly typical marine weather conditions than to the southern and western shores. However, warm and humid weather prevails in all low areas throughout the year except during occasional periods from December to March when northerly winds bring somewhat lower temperatures.

Rainfall is quite irregularly distributed, owing to topographical effects. The driest localities receive only 20 to 25 inches of rainfall annually. At most places on the coast the annual amounts are about 50 to 60 inches. In general the period December to March constitutes the season of lighter rainfall although there is diminished rainfall on

the north coast in midsummer and heavy rainfall there in winter. Elsewhere, late spring and autumn are the wet periods.

Easterly winds prevail with the usual diurnal effects in most localities. On the west coast westerly winds are fairly common and on the south coast there are southeasterly winds. Thunderstorms occur frequently from June to October especially in the western portion. At Port-au-Prince, there are thunderstorms on about half the days during those months.

Tropical storms frequently pass near the island on a westerly or northwesterly course. Hence the western part of the island is seldom devastated. The "hairpin" hurricane of October 1935 (see fig. 7 on p. 31) moving on an abnormal course, caused much loss of life in extreme southwestern Haiti. Danger is greater on the southern coast of the Dominican Republic. A number of disastrous storms have been recorded in the vicinity of Ciudad Trujillo; one of the most severe in the history of the West Indies was the hurricane at Ciudad Trujillo on September 3, 1930. (See fig. 7 on p. 31).

Hurricanes passing to the southward at sufficient distance to cause only light to fresh winds on the south coast, may produce very heavy seas known locally as "mar desbordada" in the harbor at Ciudad Trujillo. These seas appear with little warning and are dangerous to shipping. Their arrival is sometimes presaged by the change of wind from north-northwest to north-northeast with barometer below normal and stationary or falling slowly. This indicates the passage of a tropical disturbance on a westerly course at some distance south of the island.

Puerto Rico.—The climate of Puerto Rico is strictly tropical marine except as it is slightly modified by lower temperatures at higher elevations. On the coastal plains, the daily and annual ranges of temperature are small. The average annual temperature is 78° and relative humidity 78 percent of saturation. In localities protected from the prevailing winds these temperatures and humidities are decidedly uncomfortable. The highest and lowest temperatures ever recorded are 101° at Arecibo and 51° at Mayaguez.

Rainfall is abundant but is much influenced by topography. Annual amounts as an average vary from about 35 to 95 inches depending upon location. As a rule rainfall is greatest in October or November and least in February. The lee slopes of some of the mountains are arid.

The prevailing winds (trades) are between east and southeast. There are relatively small variations with the season and the hour of the day. During the day on the north coast the wind is predominantly from the east throughout the year. During winter months northeast winds are sometimes frequent, even to the extent of becoming the dominant winds in some months. Southeast winds prevail at night the remainder of the year. On the south coast there is some diurnal variation tending toward northeast at night and southeast by day.

The trade wind at San Juan varies from an average of about 7 to 8 knots in October, to about 11 to 12 knots in July. The diurnal variation is well-marked, being about 5 knots at sunrise and about 14 to 15 knots at 1400. East winds are strongest throughout the year and southwest winds lightest.

High winds are rare except in connection with tropical disturbances of cyclonic nature.

The trades at San Juan are deepest in August—about 30,000 feet—and shallowest in April or May—about 12,000 feet.

Hurricanes of the western Caribbean seldom affect Puerto Rico. Nearly all of its severe storms have come from the Atlantic in August or September. Sixty percent of tropical storms passing near Puerto Rico are more beneficial than harmful owing to rainfall attending them. Of the 64 hurricanes recorded there from 1515 to 1929, a relatively few have been devastating over wide areas. Others have caused destruction and loss of life in restricted localities. Exceptionally severe hurricanes crossed the island in 1899 and 1928. Tracks of their centers are shown in figure 7 on page 31.

Virgin Islands.—The climate of the Virgin Islands does not differ much from that of Puerto Rico. They are slightly warmer. The prevailing winds are easterly throughout the year. Hurricanes are occasionally destructive there; they come from the Atlantic, chiefly in August and September. Most of the severe storms in Puerto Rico have affected the Virgin Islands also.

Lesser Antilles.—The eastern group of small islands southward to, and including Dominica, are usually designated as the Leeward Islands. Temperatures there are somewhat higher than on the larger islands to the westward. The mean annual temperature at sea level is about 79° and the range between the warmest and coldest months is only about 5° or 6°. At higher elevations in some of the islands it is 4° or 5° cooler throughout the year.

The rainfall depends largely upon elevation and exposure to the prevailing moisture-bearing winds. Annual amounts vary from 40 inches to more than 150 inches. In general the heaviest rains occur in summer and autumn.

In these islands the trades are quite steady from an easterly direction, being slightly more to the south of east near the equinoxes and a little north of east in winter and midsummer.

Gales rarely occur except in connection with tropical cyclones, practically all of which approach the islands from the east or southeast. A change of the wind to north or northwest with falling barometer in the period from July to October is indicative of a tropical storm to the eastward.

In the Windward Islands the temperature, wind and rainfall conditions are closely parallel to those of the islands to the northwest. At

Barbados, the most easterly island, the annual range in temperature, from the warmest to the coldest months is about 5°. Destructive hurricanes occasionally cross these islands. Paths of historic examples of 1780 and 1831 are shown in figure 7 on page 31.

Trinidad.—On the island of Trinidad the climate is quite similar to that of the islands to the northward, except that the area of Trinidad is larger, resulting in somewhat greater ranges of temperature. Rainfall averages 60 inches or less annually on the west coast, increasing toward the elevated lands of the east and northeast where the annual averages are above 120 inches. The rain comes in the form of convectional showers, usually heavy and of short duration with thunder and lightning. Thunderstorms form chiefly in the heavy rain belt and move westward, diminishing in violence. The rainy season extends from June to December. Humidity is very high, about 80 percent for the year, with readings as high as 96 percent in early morning in October.

Owing to the relatively brief duration of the heavy convectional showers, the weather is mostly fair and hot.

The prevailing winds (trades) are almost due east. There is a pronounced diurnal variation in wind movement. It averages about 6 to 7 knots, but rises above 20 knots on more than three-fourths of the days in the eastern portion of the island. Occasionally land breezes replace the trades at night on the eastern coasts.

Hurricanes seldom occur as far southward as Trinidad. The hurricane of June 28, 1933, was the only one in 50 years of record to pass south of Trinidad and over the northeastern corner of Venezuela. In the island there were 13 deaths, 1,000 persons injured and property was damaged to the extent of $3,000,000.

Dutch West Indies.—As an average for the year, the temperature of the Dutch West Indies, near sea level, is the highest in the West Indian region. At Willemstad the annual mean is 81°. This high mean is due chiefly to the high minimum temperature of 76° for the year, as compared with 73° at Bridgetown, Barbados, and 72° at Port-of-Spain, Trinidad.

Rainfall is light, the annual average for the Dutch West Indies being only about 22 inches. This is 40 to 50 inches less than in many of the islands to the east and northeast. This deficiency, as compared with the Lesser Antilles, occurs chiefly in the hurricane season. Cyclonic disturbances seldom move over, or to the south of, the Dutch West Indies, whereas they occasionally cross the Lesser Antilles accompanied by torrential rains. While they are not frequent, the amounts of rainfall, even in slight disturbances, are sometimes large enough to affect the averages to a marked degree. In addition, the water surface temperatures in the vicinity of the Dutch West Indies are slightly lower in summer than in adjacent portions of the Carib-

bean Sea to the northward and northeastward. However, these factors are insufficient to account fully for the light rainfall as the amounts are less at all seasons than in the Lesser Antilles.

Over the southern half of the Caribbean Sea the average wind force is higher than in areas to the northward and eastward. In winter the prevailing wind is northeast and east-northeast; in other months the wind blows with considerable constancy from the east.

For the year as a whole the highest average wind movement in the Caribbean Sea is found in the vicinity of the Dutch West Indies and to the north and northwest of the Gulf of Venezuela. The strength of the wind is greatest in June and July and least in October and November.

Only one hurricane is known to have been destructive in the Dutch West Indies. Records indicate that the storm of September 23, 1877, passed to the southward of Curacao, moving from southeast to northwest. Many houses in Willemstad were totally or partially destroyed, both by the force of the wind and the heavy seas which came into the town. This is the only record of a fully developed tropical storm passing to the southward of Curacao.

North coast of Venezuela and Columbia.—On this coast the trade wind prevails throughout the year. Its direction is easterly along the Venezuela coast but tends more toward the north and northeast as it reaches the Caribbean coast of Colombia. Strong winds extend from the Caribbean Sea to 5 or 10 miles off the coast where they are weaker, especially at night.

Along the immediate coast the mean annual temperature is 81° to 83°. The humidity is high (76 percent) and when the wind movement is light, it is quite oppressive. The hottest period is in August and September, mean 83° to 84°. In the elevated regions, which are very near the coast, it is cooler. For example, at La Guaira, on the coast, the annual mean is 81° while at Caracas, elevation 3,420 feet, it is 67°.

Rainfall is light on the coast of Venezuela, which is remarkable considering the persistent trade winds and their high moisture content. The annual average is about 20 inches; La Guaira (1920–25) averaged only slightly more than 11 inches. To the westward rainfall increases; on the Caribbean coast of Colombia it averages 40 to 50 inches in the year.

Except in very rare cases the hurricanes which cross the Caribbean Sea to the northward do not seriously affect these coasts. The hurricane at the end of June 1933 passed over the Gulf of Paria and the northeastern tip of Venezuela, attended by destructive winds.

METEOROLOGICAL TABLES

[Station: Hamilton, Bermuda. Position: Lat. 32°17′ N., Long. 64°46′ W. Altitude: 151 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind											Number of days with—						Cloud amount (0–10)	
											Percentage of observations from—																
	Mean	Mean maximum	Mean minimum	9 a. m.	9 p. m.	Average fall (inches)	Number of rainy days	Maximum fall in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Fog	Thunderstorms	Gales	Clear	Cloudy	Lightning (distant)	9 a. m.	9 p. m.
January	63	68	58	81	83	4.36	16	3.0	11.6	42.6	12	12	4	6	8	24	12	15	7	0	1	0.5	2	14	0.4	6.8	6.1
February	63	68	57	79	82	4.69	15	5.4	12.7	61.7	10	13	4	7	8	26	10	17	5	0	1	.6	1	13	.3	6.8	6.4
March	63	68	57	80	84	4.78	15	5.1	12.5	41.7	13	11	4	7	8	25	12	16	4	0	1	.4	4	12	.2	6.6	6.1
April	66	71	59	80	83	4.04	11	11.4	12.0	40.0	12	12	3	7	10	25	12	15	4	0	1	.2	4	9	.5	6.7	5.5
May	70	76	64	83	88	4.50	11	5.5	9.8	33.0	9	11	6	12	13	27	8	9	5	.1	1	.0	4	8	.3	6.1	5.4
June	76	81	69	84	89	4.50	11	8.0	9.3	29.5	5	7	5	11	15	34	11	7	5	0	2	.0	4	9	.6	6.2	5.5
July	79	85	73	81	87	4.48	12	4.4	8.8	28.7	3	4	4	13	15	38	10	7	6	0	3	.1	5	5	1.2	5.7	4.8
August	80	86	74	81	87	5.55	14	5.9	8.2	46.9	4	7	5	13	14	32	11	7	7	0	4	.1	4	6	2.1	5.7	4.8
September	79	84	72	80	85	5.09	13	6.1	8.9	86.8	8	20	11	14	10	19	6	5	7	0	3	.5	5	5	1.6	5.6	4.4
October	74	79	69	81	84	5.85	14	5.7	10.1	69.5	10	23	10	13	9	17	4	8	6	0	2	.3	2	11	1.3	6.4	5.7
November	69	74	63	79	81	4.98	15	6.0	11.3	46.9	12	19	6	9	7	18	9	14	6	0	1	.4	3	11	.6	6.4	5.9
December	65	70	60	81	83	4.83	15	4.6	11.9	44.3	12	16	4	6	7	21	9	16	9	0	1	.3	3	12	.1	6.7	6.3
Mean	71	76	65	81	85				10.6		9	13	6	10	10	26	9	11	6							6.3	5.6
Total						57.65	162													.1	21	3.4	41	115	9.2		
Extremes								11.4		86.8																	
Number of years' observations	65	66	59	16	16	65	64	64	23	29	55									64	22	62	11	11	16	16	16

[Station: Grand Turk Island, Bahama Islands. Position: Lat. 21°29′ N., Long. 71°07′ W. Altitude: 11 feet]

Month	Air temperature °F.			Rain			Wind										Number of days with—		Cloud amount (0–10) 8 a. m.
								Percentage of observations from—											
	Mean	Mean maximum	Mean minimum	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Clear	Cloudy	
January	76	81	70	2.21	13	2.24	10.1	2	22	49	21	2	(2)	3	(2)	1	11.4	9.4	5.5
February	75	81	70	1.42	8	4.95	9.0	5	16	47	21	4	2	1	3	1	12.8	3.5	5.3
March	76	82	71	1.11	8	2.78	9.6	7	16	39	24	4	3	3	4	(2)	14.2	5.5	5.1
April	78	84	73	1.51	6	2.90	9.6	2	13	58	22	3	1	(2)	0	1	11.2	4.5	5.4
May	80	86	75	2.59	8	4.34	9.6	1	4	53	31	6	1	2	1	1	4.8	11.0	6.4
June	82	87	77	1.58	9	4.35	10.9	(2)	5	62	30	2	0	0	0	1	7.5	7.0	5.8
July	83	88	77	1.74	10	[1] 5.00	10.9	0	5	66	28	1	0	0	0	0	8.4	8.2	5.5
August	84	89	78	2.03	12	3.66	10.0	1	9	59	29	2	(2)	(2)	(2)	0	9.4	7.6	5.4
September	83	88	77	3.22	11	[1] 10.00	8.7	1	10	44	34	6	1	2	2	(2)	9.0	5.8	5.8
October	81	87	76	3.98	13	5.34	8.2	2	14	48	25	3	2	3	2	1	10.6	10.2	6.2
November	79	84	73	4.51	14	3.81	9.5	9	26	41	12	4	2	2	3	1	7.6	9.6	6.5
December	76	82	71	2.75	13	2.80	9.3	4	29	44	18	2	0	1	1	1	7.8	8.0	5.2
Mean	79	85	74				9.6	3	14	51	25	3	1	1	1	1			5.7
Total				28.65	125												114.7	90.3	
Extremes						[1] 10.00													
Number of years' observations		10		40	19	27	10	10									5	5	10

[1] Estimated values.

[2] Less than 0.5 percent.

Meteorological tables—Continued

[Station: Nassau, Bahama Islands. Position: Lat. 25°05′N., Long. 77°21′W. Altitude: 12 feet]

Month	Air temperature °F.			Relative humidity (percent) mean of 0800 and 1500	Rain			Wind										Number of days with—					Cloud amount (0–10) daily mean
									Percentage of observations from—														
	Mean	Mean maximum	Mean minimum		Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Gales	Ceiling less than 1,000 feet	Visibility less than 1 mile	Fog	Thunderstorms	
January	71	76	67	76	2.11	9	4.5	7.6	9	32	17	18	6	5	2	9	2	0.5	0	0	0.2	0.9	5.4
February	72	77	67	74	1.73	7	2.7	7.6	8	27	13	20	7	7	2	12	4	.5	0	0	0	.6	5.3
March	73	78	68	71	1.54	6	2.5	7.6	9	26	14	22	7	6	2	11	3	.3	.7	0	0	.9	5.1
April	75	80	69	71	2.41	6	2.9	7.6	7	29	15	22	8	5	3	8	3	.3	.7	0	0	1.0	5.2
May	78	83	72	73	5.33	11	7.4	6.0	6	26	15	27	10	6	1	5	4	.2	----	----	.1	3.0	6.0
June	80	86	75	73	6.25	13	5.4	5.3	4	18	21	34	9	5	1	2	6	0	----	----	0	4.7	6.2
July	82	88	76	72	5.91	16	4.4	4.9	1	16	22	37	9	6	1	2	6	0	----	----	0	5.1	5.9
August	82	88	76	72	6.29	16	6.4	5.3	2	17	21	36	9	5	1	3	6	.2	----	----	0	4.7	5.9
September	82	87	76	73	7.54	17	6.5	4.9	5	28	22	25	5	4	1	3	7	.3	----	----	0	3.3	5.9
October	80	85	75	74	6.49	14	[1]8.0	6.8	7	37	20	15	4	4	1	5	7	.3	----	----	0	1.0	5.9
November	76	80	71	74	2.66	9	7.4	7.6	12	39	18	11	3	4	2	8	3	.5	----	----	0	.2	5.4
December	73	78	69	75	1.40	8	2.4	8.0	10	34	15	15	6	4	2	10	4	.5	----	----	.2	.1	5.3
Mean	77	82	72	73	----	----	----	6.6	7	27	18	23	7	5	2	6	5	----	----	----	----	----	5.6
Total	----	----	----	----	49.66	132	----	----	----	----	----	----	----	----	----	----	----	3.6	----	----	.5	25.5	----
Extremes	----	----	----	----	----	----	[1]8.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Number of year's observations	15			24	63	52		34	43									52	3		52	21	44

[1] Estimated value, rain gage blown away in 1908 hurricane.

[Station: Cienfuegos, Cuba. Position: Lat. 22° 09′ N., Long. 80°27′ W. Altitude: 98 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind										Number of days with—						Cloud amount (0-10) daily mean
											Percentage of observations from—														
	Mean	Mean maximum	Mean minimum	6 a. m.	12 m.	Average fall (inches)	Number of rainy days.	Maximum fall in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Fog	Visibility less than 1 mile	Ceiling below 1,000 feet	Thunderstorms	Wind 22 knots or more	Gales	
January	72	81	63	91	57	0.72	4	0.95	5.7	31.1	13	42	12	1	13	10	1	2	6	1.0	0	0	0.2	0	0	3.3
February	72	82	62	90	53	1.87	3	1.02	5.6	39.6	13	34	9	2	17	12	2	4	7	1.0	.3	.3	1.3	4.0	.6	3.1
March	74	84	64	89	51	1.25	5	1.85	5.2	38.9	9	33	10	3	21	15	1	2	6	1.0	0	0	2.4	1.3	0	3.5
April	76	85	67	88	52	1.37	5	1.33	5.6	39.4	7	30	11	2	24	16	1	2	7	.5	.3	.3	3.7	3.0	0	4.3
May	78	87	69	89	56	4.81	11	3.66	4.6	39.8	6	24	11	3	23	20	1	2	10	.4	0	.3	9.6	2.0	.3	5.4
June	80	89	71	90	59	5.69	14	4.45	4.3	58.3	5	27	14	5	21	16	1	2	9	.2	.3	0	16.2	.7	.4	6.3
July	81	90	72	91	56	4.96	14	2.40	4.4	38.9	7	26	16	5	18	15	2	2	9	.3	0	.3	19.6	.7	.1	5.3
August	81	90	72	92	57	5.06	15	2.11	4.4	38.9	7	27	20	4	17	14	1	2	8	.1	.7	1	18.9	3.0	.6	5.2
September	80	89	71	93	61	5.65	15	2.40	4.2	68.0	8	26	16	4	19	14	2	2	9	.2	.5	.5	15.7	4,0	.6	5.9
October	79	88	71	94	62	5.95	13	4.53	4.3	39.6	8	32	16	4	16	11	1	2	10	.3	.3	.7	9.1	2.0	0	5.6
November	75	83	67	92	61	2.10	5	4.29	5.8	39.8	11	50	16	2	8	6	1	2	4	.3	0	0	1.4	0	.6	4.2
December	73	82	64	93	59	1.10	3	1.66	5.4	38.9	10	46	13	1	10	9	1	2	8	.6	0	0	.5	.3	0	3.1
Mean	77	86	68	91	57				5.0		9	33	14	3	17	13	1	2	8							4.6
Total						39.53	107													5.9	2.4	3.4	98.6	21.0	3.2	
Extremes								4.53		68.0																
Number of year's observations	12								12												3		17	2	7	12

Meteorological tables—Continued

[Station: Habana, Cuba. Position: Lat. 23°08′ N., Long. 82°21′ W. Altitude: 80 feet]

Month	Air temperature ° F.			Relative humidity (percent)		Rain			Wind											Number of days with—					Cloud amount (0–10)	
											Percentage of observations from—															
	Mean	Mean maximum	Mean minimum	6 a. m.	12 noon	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	Maximum wind velocity in knots	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Wind of 33 knots or greater	Visibility less than 1 mile	Ceilings below 1,000 feet	Thunderstorms	Fog	Morning	Night
January	72	79	65	85	64	2.85	8	6.43	7.2	50.4	24	22	22	13	7	3	2	7	0	3	0.3	0	0.6	1.0	5	3
February	72	79	65	85	61	1.84	6	3.13	7.2	62.5	19	19	20	16	13	3	2	8	0	2	1.0	1.3	.8	2.0	4	3
March	74	81	67	84	58	1.84	5	3.30	7.6	58.2	16	25	26	15	10	2	2	4	0	3	.3	.7	1.4	2.0	4	3
April	77	84	69	83	58	2.25	5	4.47	7.6	50.4	19	28	26	13	6	1	2	5	0	3	.7	.3	3.0	1.0	4	2
May	79	86	72	85	62	4.66	10	6.27	6.6	54.7	16	33	28	12	4	1	1	5	0	1	0	.3	8.1	1.0	4	3
June	81	88	74	87	65	6.51	13	4.78	5.8	50.4	10	28	31	17	9	2	1	2	0	2	0	0	14.2	.5	5	4
July	82	89	74	87	62	4.87	12	4.07	5.8	50.4	10	30	37	13	5	2	1	2	0	1	0	0	14.9	.3	4	4
August	82	89	75	88	64	5.28	14	4.44	5.8	58.2	13	27	29	16	7	2	2	4	0	2	0	.3	15.7	.4	4	4
September	81	88	74	89	66	5.88	15	3.76	5.6	87.7	12	24	27	20	9	2	2	4	0	2	1.7	1.3	12.9	.4	5	4
October	79	85	73	87	68	6.78	15	6.53	7.0	116.4	20	29	22	12	7	3	2	5	0	2	1.0	1.7	6.1	.6	5	4
November	75	81	69	85	65	3.11	10	7.56	7.4	67.7	19	35	25	9	5	1	1	5	0	3	0	1.3	.8	.5	5	4
December	72	80	67	84	64	2.32	8	5.82	7.2	50.4	21	26	25	12	6	2	2	6	0	1	1.0	.7	.9	1.0	5	4
Mean	77	84	70	86	63				6.8		17	27	26	14	7	2	2	5	0						5	3
Total						48.19	121													25	6.0	7.9	79.4	10.7		
Extremes								7.56		116.4																
Number of years' observations	60	25	25	43	43	72	70	53	42	53	11									25	3	3	20	30	45	45

[Station: Nuevitas, Cuba. Position: Lat. 21°33′ N., Long. 77°16′ W. Length of record: 3 years. Temperature: The temperature rarely drops below 70° F. and seldom exceeds 88° F. except during "northers" or continued high northerly winds, at which time the temperature drops sharply. Haze: On rare occasions, there is a slight morning haze at sunrise, which burns off by 0800 or 0900]

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Prevailing wind direction	NE.	ENE.	ENE.	ENE.	E.	E.	E.	E.	E.	NE.	NE.	NE.	E.
Average hourly wind velocity, knots	10.7	9.6	12.4	9.6	8.9	8.1	8.9	8.9	8.4	9.3	9.6	9.3	9.5
Number of days with wind 22 knots or more	.7	1.3	4.3	.7	.7	.7	0	.3	.3	2.3	2.7	2.3	16.3
Number of days with wind 28 knots or more	0	0	0	0	.3	0	0	0	0	.3	0	0	.6
Number of days with visibility less than 1 mile	.7	.3	0	.3	.3	2.0	.3	.3	1.3	2.0	1.0	.7	9.2
Number of days with ceiling below 1,000 feet	1.0	.7	0	0	.7	2.0	.3	0	1.3	2.0	1.0	1.3	10.3
Number of days with dense fog	0	0	0	0	0	0	0	0	0	0	0	.3	.3
Number of days with thunderstorm	0	0	0	2.7	5.7	5.7	5.7	8.0	8.7	5.7	0	0	42.2
Number of days with precipitation of 0.01 inch or more	9.3	3.7	5.0	4.7	12.0	7.3	7.3	9.0	9.3	16.7	7.0	6.3	97.6

[Station: Preston, Cuba. Position: Lat. 20°46′ N., Long. 75°39′ W. Altitude: 16 feet]

Month	Air temperature, ° F.			Rain		
	Mean	Mean maximum	Mean minimum	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)
January	74	80	67	4.03	11	5.24
February	74	81	66	2.21	7	2.84
March	75	82	68	1.25	5	1.50
April	76	83	69	2.88	7	5.20
May	78	86	71	4.65	8	2.82
June	80	88	72	2.36	5	4.02
July	81	89	73	1.50	5	2.40
August	81	89	73	2.08	5	2.15
September	81	89	73	3.88	9	2.60
October	80	88	72	6.42	10	7.44
November	77	84	71	8.21	11	4.70
December	75	82	68	5.31	10	7.80
Mean	78	85	70			
Total				44.81	93	
Extremes						7.80
Number of years' observations	10			17	14	12

Meteorological tables—Continued

[Station: San Julian Airport, Guane, Cuba. Position: Lat. 22°08′ N., Long. 84°08′ W. Length of record: 3 years]

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Prevailing wind direction	E.	E.	E.	E.	E.	E.	E.	E.	E.	E.	N.	E.	E.
Average hourly wind velocity, knots	5.8	6.1	6.7	5.5	5.8	5.2	5.2	5.2	5.2	5.5	5.5	6.7	5.7
Number of days with wind 22 knots or more	.3	0	.7	.3	.7	0	0	.3	.3	2.0	0	0	4.6
Number of days with wind 28 knots or more	.3	.3	0	0	0	0	0	0	0	.3	0	0	.9
Number of days with visibility less than 1 mile	.3	.3	0	0	.7	1.0	0	1.3	.7	0	0	0	4.3
Number of days with ceiling below 1,000 feet	2.3	2.0	1.3	2.0	5.0	3.7	2.0	3.7	6.8	2.0	.7	2.7	34.2
Number of days with dense fog	0	.3	0	0	0	0	0	0	0	0	0	0	.3
Number of days with thunderstorm	2.7	.7	0	4.0	9.0	12.7	9.3	13.0	3.3	6.3	.3	2.0	63.3
Number of days with precipitation of 0.01 inch or more	1.7	1.7	2.0	4.3	7.7	8.3	4.3	6.3	6.7	8.7	.7	3.3	55.7

[Station: Santiago de Cuba, Cuba. Position: Lat. 20°00′ N., Long. 75° 49′ W. Altitude: 82 feet]

Month	Air temperature °F.			Rain			Wind			Number of days with—				
	Mean	Mean maximum	Mean minimum	Average fall (inches)	Number of rainy days	Maximum fall in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	Prevailing direction	Wind 22 knots or more	Visibility less than 1 mile	Ceiling less than 1,000 feet	Thunder storm	Dense fog
January	75	83	68	1.47	4	3.45	3.5		NE.	0	0	0	0.3	0
February	75	83	68	.87	3	1.02	3.5		NE.	0	0	0	.7	0
March	77	84	69	1.72	4	1.57	3.7		NE.	0	0	0	1.0	0
April	78	85	71	3.32	6	3.94	3.2		NE.	0	0	0	3.3	0
May	80	86	73	6.45	10	4.53	2.6		NE.	0	0	0	1.7	0
June	81	87	74	5.39	10	7.28	2.6		NE.	0	.3	0	11.0	0
July	82	89	75	2.26	8	6.23	3.5		NE.	.3	0	0	9.0	0
August	82	90	75	3.58	10	4.38	3.7		NE.	0	0	0	13.7	0
September	81	88	74	6.66	11	14.34	2.9		NE.	0	.7	1.3	12.0	.3
October	80	87	73	7.40	14	8.62	3.2	(1)	NE.	.7	1.3	2.7	7.3	0
November	78	85	71	3.61	7	5.10	4.1		NE.	0	.3	.7	2.7	.3
December	76	83	69	1.06	5	2.14	3.7		NE.	0	.7	.3	.7	0
Mean	79	86	72				3.4		NE.					
Total				43.79	92					1.0	3.3	5.0	63.4	.6
Extremes						14.34								
Number of years' observations	16			21	17	16	3		3	3	3	3	3	3

[1] In 1935, 1 day N. 26, 1 day E. 52.

[Station: Kingston, Jamaica. Position: Lat. 17°58′ N., Long. 76°48′ W. Altitude: 110 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind											Number of days with—								Cloud amount (0–10)	
	Mean	Mean maximum	Mean minimum	7 a. m.	3 p. m.	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	Percentage of observations from— North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Thunderstorm	Clear skies	Cloudy skies	Fog	Visibility less than 1 mile	Ceiling less than 1,000 feet	Wind 22 knots or over	Wind 35 knots or over	7 a. m.	3 p. m.
January	76	86	67	83	62	0.92	5	1.52	5.8	32	16	2	32	8	3	2	5	0	0.5	9.8	13.6	0	0	0.3	0.0	1	3.6	4.8
February	76	86	67	82	62	.67	3	1.82	6.4	30	14	4	37	7	2	0	4	2	.2	10.8	10.5	0	0	0	.7	0	3.3	5.4
March	77	86	68	81	62	.96	5	1.28	6.7	29	13	2	40	8	2	0	5	1	.7	9.0	9.1	0	0	0	3.3	0	3.2	6.0
April	78	87	70	78	65	1.18	5	1.78	6.9	28	15	5	44	3	0	0	3	2	1.5	7.4	8.7	0	0	0	1.0	0	3.6	6.4
May	80	87	72	77	69	4.16	7	6.84	7.4	24	11	5	51	3	0	2	2	2	3.4	4.7	15.0	0	0	.3	.7	1	4.4	6.8
June	81	89	74	77	67	4.00	6	6.27	8.5	25	13	3	57	0	0	0	2	0	6.2	4.6	12.5	0	0	1.0	.3	0	5.2	7.0
July	81	90	73	77	64	1.53	5	4.40	8.2	29	11	3	50	0	0	0	5	2	6.7	5.9	7.3	0	0	.7	4.0	0	4.4	6.1
August	81	90	73	78	67	3.37	8	3.12	7.2	31	14	3	42	2	2	2	3	1	8.4	5.5	6.3	0	0	2.3	.3	3	4.6	7.0
September	81	89	73	82	69	4.42	9	6.45	5.9	30	15	3	40	3	2	2	3	2	10.5	3.1	7.7	0	0	2.0	1.0	0	4.8	7.9
October	79	88	73	86	71	6.96	11	6.49	5.6	30	13	3	42	5	0	2	3	2	8.2	4.2	7.7	0	0	4.7	.7	0	4.9	7.5
November	78	87	71	86	69	2.80	7	8.93	5.2	34	14	5	22	11	5	2	5	2	2.9	7.2	10.8	0	0	1.7	0	0	4.8	7.1
December	77	87	69	85	64	1.55	5	3.62	5.3	32	16	2	26	11	5	2	5	1	.6	9.8	11.6	0	0	0	.3	0	4.0	5.2
Mean	79	88	71	81	66				6.6	30	14	3	40	5	2	1	4	1									4.2	6.4
Total						32.52	76												49.8	81.9	120.6	0	0	13.0	12.3	5		
Extremes								8.93																			12	12
Number of years' observations		33		16	16	53	25	30	16					10					14	7	7	37	3	3	3			

Meteorological tables—Continued

[Station: Cap Haitien, Haiti. Position: Lat. 19°46′ N., Long. 72°12′ W. Altitude: 49 feet]

Month	Air temperature °F.			Rain			Wind — Percentage of observations from—									Number days with—			Cloud amount (0–10)		
	Mean	Mean maximum	Mean minimum	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Thunderstorms	Clear skies	Cloudy skies	7 a. m. mean	1 p. m. mean	9 p. m. mean
January	72	80	67	4.38	6	4.57	13	29	17	5	6	5	7	5	13	0.6	12.7	2.0	2.8	3.0	3.8
February	74	80	67	4.43	6	7.32	24	28	15	2	6	3	7	5	10	.3	12.3	3.0	2.8	3.2	3.9
March	74	81	68	3.52	6	7.10	20	32	11	5	5	3	5	4	15	.1	13.3	2.3	2.9	2.9	4.0
April	76	82	69	3.08	5	3.82	18	33	10	6	3	2	3	7	18	.9	13.3	2.6	2.5	3.1	3.8
May	78	84	71	5.12	8	3.35	27	24	13	6	9	7	2	3	9	5.0	8.5	6.3	3.0	3.2	5.2
June	80	86	73	3.32	5	2.48	21	32	6	2	10	4	4	3	18	3.6	12.7	2.2	2.1	2.5	4.0
July	79	86	72	1.39	4	2.20	17	33	11	2	14	2	3	4	14	2.5	12.0	2.2	2.3	3.1	4.5
August	79	86	72	1.65	4	4.26	7	41	11	6	6	2	1	4	22	3.7	6.6	1.4	2.1	3.2	4.9
September	80	87	72	3.74	7	3.52	8	39	11	4	8	3	1	4	22	4.8	8.1	2.0	2.6	3.3	6.0
October	78	85	71	8.02	9	5.96	18	30	7	2	15	2	3	6	17	6.2	8.3	3.2	2.8	3.4	5.4
November	76	82	70	10.61	11	7.09	17	27	10	3	10	4	3	8	18	2.3	10.0	5.0	3.6	3.9	5.3
December	75	81	69	6.89	7	9.04	17	30	12	1	6	3	5	9	17	.8	10.7	4.0	3.4	4.1	4.3
Mean	77	83	70				17	32	11	4	8	3	4	5	16				2.7	3.2	4.6
Total				56.15	78											30.8	128.5	36.2			
Extremes						9.04															
Number of years' observations	7			23	19	22	6									7			6		

[Station: Port-au-Prince, Haiti. Position: Lat. 18°33′ N., Long. 72°20′ W. Altitude: 121 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind											Number of days with—									Percentage of possible sunshine	Cloud amount (0–10)	
	Mean	Mean maximum	Mean minimum	7 a. m. mean	1 p. m. mean	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations [1] from—									Wind 22 knots or more	Visibility less than 1 mile	Exceptional visibility	Ceiling less than 1,000 feet	Dense fog	Distant lightning	Thunderstorms	Clear skies (0–2)	Cloudy skies (8–10)		7 a. m. mean	1 p. m. mean
											North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm											
January	76	87	68	72	43	1.24	5	1.80	5.8	29.1	0	4	56	15	1	3	17	4	0	0	0	3.6	0	0	1.1	0.9	16.9	1.1	81	1.3	2.2
February	77	88	68	74	45	2.49	7	7.20	5.8	36.9	0	5	50	12	2	3	21	6	1	0	0	2.6	0	0	.7	.9	11.5	2.2	78	1.9	2.9
March	78	89	69	72	46	3.61	10	3.50	5.8	31.1	0	4	47	12	1	3	25	7	1	0	0	2.3	0	0	1.3	2.0	11.6	1.8	76	2.1	2.6
April	79	89	71	75	51	6.37	14	4.40	5.6	28.3	1	4	49	10	1	3	23	8	1	0	0	2.7	0	0	2.7	5.0	6.4	2.6	72	2.7	3.5
May	80	90	72	76	54	9.23	16	4.30	5.4	29.1	1	4	54	11	2	3	18	6	1	0	0	3.8	0	0	5.9	10.5	4.9	5.1	64	3.3	4.7
June	82	92	73	74	50	4.06	9	2.87	6.4	35.0	1	6	57	15	1	2	11	6	1	0	0	2.8	0	0	6.1	11.7	4.5	3.7	66	2.6	4.7
July	82	94	74	70	46	2.73	9	2.87	6.4	38.9	1	6	53	16	1	2	14	6	1	.7	.7	2.2	.7	0	6.6	12.8	6.8	2.0	67	2.1	4.1
August	82	93	73	75	50	5.57	13	5.24	5.8	40.8	1	4	50	13	1	2	18	7	1	.3	0	2.7	0	0	6.8	14.7	4.7	2.7	68	2.2	4.0
September	81	91	73	78	55	7.09	15	5.80	5.1	29.1	0	3	53	14	1	3	19	6	1	0	0	6.4	0	0	5.2	15.9	4.5	4.1	65	2.6	4.1
October	80	90	72	81	57	6.56	14	4.30	4.7	31.1	0	3	55	13	1	4	18	5	1	0	0	8.5	.3	0	6.9	12.2	4.9	2.5	68	2.5	4.0
November	78	88	71	79	56	3.49	9	3.20	4.7	23.3	0	3	52	16	2	4	19	4	0	0	0	6.0	0	0	5.1	5.2	9.2	2.5	70	2.5	3.4
December	77	87	69	75	49	1.30	5	3.43	5.4	27.2	0	3	53	18	2	3	17	3	1	0	0	4.2	0	0	2.0	1.3	18.6	1.0	80	1.4	2.2
Mean	79	90	71	75	50				5.6		(2)	4	53	14	1	3	18	6	1	1.0	.7	45.8	1.0	0	50.4	93.1	104.5	31.3	71	2.3	3.5
Total						53.74	127																								
Extremes								7.20		40.8					19																
Number of years' observations	49	42	42	21	21	56	42	46	22	8										3	3	20	3	3	21	21	15	15	22	20	21

[1] 8 observations per day.

[2] Less than 0.5 percent.

128156—40——11

Meteorological tables—Continued

[Station: Ciudad Trujillo, Dominican Republic. Position: Lat. 18°28′ N., Long. 69°54′ W. Altitude: 69 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind											Number of days with—		Cloud amount (0–10) mean [2]
											Percentage of observations from [1]—											
	Mean	Mean maximum	Mean minimum	6 a. m. mean	Noon mean	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Gales	Fog	
January	75	84	66	91	64	2.39	9	2.30	7.6	25.3	55	18	5	6	9	[3]	0	5	2	0	0	4.4
February	75	85	66	88	58	1.41	6	1.40	7.2	28.2	51	13	4	5	15	1	1	7	2	0	0	4.5
March	76	84	67	90	60	1.88	7	2.78	7.8	35.0	46	19	7	7	12	1	[3]	5	2	0	0	4.3
April	77	85	69	90	62	3.87	9	8.85	7.6	25.3	40	16	6	8	18	2	1	6	2	0	0	5.1
May	79	86	71	89	65	6.81	14	4.95	7.2	33.0	35	19	7	8	20	2	1	6	3	0	0	5.2
June	80	87	72	90	66	6.22	14	5.39	7.4	42.8	35	18	7	10	23	1	1	3	2	0	0	5.0
July	80	88	72	90	66	6.39	15	5.72	7.6	52.5	41	17	6	12	17	1	1	5	1	.2	0	4.6
August	81	88	73	90	66	6.29	14	4.04	7.0	32.1	42	19	6	9	16	1	1	5	1	0	0	4.8
September	80	88	72	91	66	7.28	14	20.00	6.8	52.5	38	16	6	12	18	3	1	5	2	.1	0	4.5
October	79	87	72	92	66	6.04	13	4.56	7.2	35.0	40	14	4	11	20	5	1	3	2	0	.1	4.4
November	78	86	70	92	66	4.84	11	6.10	8.2	33.0	45	18	3	8	15	5	1	4	1	0	0	4.3
December	76	85	67	91	66	2.36	9	1.44	8.4	25.3	46	27	7	8	4	1	[3]	4	2	0	0	4.7
Mean	78	86	70	90	64				7.5		42	18	6	9	15	2	1	5	2			4.6
Total						55.78	135															
Extremes								20.00		52.5										.3	.1	
Number of years' observations		26		4	4		25		8	8					18					7	7	4

[1] Based on a. m. and p. m. observations July to November inclusive; 8 a. m. observations for other 7 months.
[2] Observations 6, 12, 21 hours.
[3] Less than 0.5 percent.

Source: Compiled from broken records.

[Station: Puerto Plata, Dominican Republic. Position: Lat. 19°49′ N., Long. 70°41′ W. Altitude: 21 feet]

Month	Air temperature °F.			Relative humidity (percent), daily mean	Rain			Wind											Number days with—					Cloud amount (0–10)		
	Mean	Mean maximum	Mean minimum		Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots) [1]	Maximum velocity (knots)	Percentage of observations from [1]—									Fog	Thunderstorms	Distant lightning	Clear skies	Cloudy skies	7 a. m. mean	1 p. m. mean	9 p. m. mean
										North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm								
January	74	80	68	79	7.13	14	8.74	6.4	33.9	3	8	48	21	4	2	3	1	10	3.2	0.2	0	8.8	2.0	4.5	3.7	4.3
February	73	80	67	78	5.79	9	9.65	5.1	17.4	5	7	50	13	5	3	4	1	13	1.2	.2	.1	6.5	2.0	3.9	3.3	4.1
March	74	80	68	78	4.34	10	5.51	4.3	30.4	5	10	44	17	3	3	3	2	13	.1	.2	.1	9.2	2.4	3.8	3.3	4.1
April	75	82	69	78	6.33	9	12.36	5.2	36.5	5	6	50	16	3	1	2	2	15	0	2.4	.6	5.2	3.5	3.4	3.1	4.9
May	77	84	71	78	5.51	10	9.25	4.3	36.5	2	6	51	15	3	1	3	1	19	0	5.8	.2	7.5	1.5	3.0	3.3	4.7
June	79	85	73	80	1.97	6	2.86	5.2	36.5	1	2	57	21	3	(2)	(2)	1	13	0	4.7	.9	12.2	.2	2.6	3.2	3.9
July	79	85	74	81	3.22	8	4.33	6.8	35.6	(2)	1	71	21	2	(2)	(2)	0	4	0	4.5	.4	10.6	.8	2.9	3.2	4.0
August	80	86	74	81	2.90	8	5.51	10.0	32.9	1	3	62	18	2	1	1	1	11	0	3.3	.8	12.8	1.4	2.8	3.1	4.0
September	80	86	74	80	3.94	9	6.69	6.2	34.7	3	5	57	14	2	2	3	1	13	0	4.5	1.8	9.4	1.4	2.7	3.0	4.1
October	79	86	72	80	4.65	11	4.26	4.4	32.1	4	4	47	15	4	2	5	1	18	0	4.3	1.3	9.4	4.2	2.7	2.8	4.4
November	77	82	71	82	15.64	16	10.75	3.3	30.4	7	9	35	16	5	3	4	2	19	.2	1.9	.4	5.7	5.2	4.4	3.8	5.5
December	74	80	69	80	9.29	16	8.66	6.9	31.3	4	6	45	17	6	4	3	1	13	2.8	.9	.1	7.4	2.0	4.3	3.7	4.6
Mean	77	83	71	80	------	------	------	5.7	------	3	6	51	17	4	2	3	1	13	------	------	------	------	------	3.4	3.3	4.4
Total	----	----	----	----	70.71	126	------	------	------	----	----	----	----	----	----	----	----	----	7.5	32.9	6.7	104.7	26.6	------	------	------
Extremes	----	----	----	----	------	----	12.36	------	36.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Number of years' observations	25			6	26			4	4	17									19	17	17	5	5	18		

[1] From 8 a. m. and 8 p. m. observations.

[2] Less than 0.5 percent.

[Station: San Pedro De Macoris, Dominican Republic. Position: Lat. 18°27′ N., Long. 69°18′ W. Length of record: 3 years]

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Prevailing wind direction	NE.	SE.	SE.	SE.	SE.	SE.	SE.	SE.	SE.	SE.	NE.	NE.	SE.
Average hourly wind velocity, knots	5.2	6.3	6.7	6.7	5.8	5.8	6.1	5.0	5.2	5.2	5.0	5.5	5.7
Number of days with wind 22 knots or more	0	0	.7	0	.3	.3	1.3	1.3	1.7	1.3	0	.3	7.2
Number of days with wind 28 knots or more	0	0	0	0	0	0	.3	.6	.6	1.3	0	0	2.8
Number of days with visibility less than 1 mile	0	.7	0	.3	.3	0	0	3.7	1.7	.3	1.0	.3	8.3
Number of days with ceiling below 1,000 feet	0	1.3	1.0	0	2.0	1.0	2.3	4.3	1.7	2.0	1.7	.3	17.6
Number of days with dense fog	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of days with thunderstorm	0	.3	0	0	2.0	.3	4.0	2.0	1.3	.7	.7	.3	11.6
Number of days with precipitation of 0.01 inch or more	4.3	3.3	6.7	3.7	10.0	7.3	6.3	11.3	10.3	13.0	9.0	7.7	92.9

Meteorological tables—Continued

[Station: San Juan, Puerto Rico. Position: Lat. 18°28′ N., Long. 66°05′ W. Altitude: 82 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind										Number of days with—							Percentage of possible sunshine	Cloud amount (0–10)	
											Percentage of hours from—																	
	Mean	Mean maximum	Mean minimum	9 a. m. mean	9 p. m. mean	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Wind 29 knots or more	Ceiling less than 1,000 feet	Visibility less than 1 mile	Dense fog	Thunderstorms	Clear skies	Cloudy skies		9 a. m. mean	9 p. m. mean
January	75	80	70	78	79	4.20	21	4.52	10.9	37.3	4	12	54	14	10	4	1	1	0	1.9	2.3	1.0	0	(2)	11	4	64	4.6	3.7
February	75	80	69	79	78	2.77	15	4.84	9.9	34.7	3	13	48	17	13	4	1	1	0	.5	1.6	.3	0	(2)	11	3	69	4.4	3.5
March	75	81	70	76	77	2.97	16	3.64	10.5	33.0	4	14	47	16	14	3	1	1	0	2.1	1.3	.3	0	(2)	12	4	69	4.2	3.6
April	77	82	71	75	78	4.12	13	6.72	10.2	30.4	2	12	49	18	15	3	1	0	0	.2	1.0	.7	0	2	11	5	65	4.6	3.8
May	79	84	73	76	80	5.69	16	4.81	9.7	29.5	1	6	51	24	16	1	1	0	0	.2	3.3	.7	0	5	8	8	59	5.1	4.2
June	80	85	75	76	82	5.37	17	5.26	10.2	34.7	0	3	62	25	10	0	0	0	0	.1	1.3	0	0	7	7	8	61	5.1	4.4
July	80	85	75	77	81	5.78	20	4.05	11.2	44.3	0	4	69	18	8	1	0	0	0	.5	1.7	0	0	7	8	6	64	4.8	4.2
August	80	85	76	77	81	5.98	20	6.26	10.5	60.8	1	7	60	18	11	2	1	0	0	.5	2.0	1.0	0	7	10	5	68	4.1	3.8
September	80	86	75	78	82	6.46	18	8.50	8.6	[1] 129.4	2	8	43	21	20	4	1	1	0	.8	3.0	0	0	10	6	7	62	4.4	4.2
October	80	86	74	79	83	5.56	18	3.87	7.6	35.6	2	10	34	22	26	4	1	1	0	.2	1.3	0	0	8	9	6	64	4.1	4.0
November	78	84	73	80	82	6.96	19	8.06	8.7	34.7	4	14	36	19	19	5	2	1	0	1.1	.7	.3	0	3	9	6	63	4.4	4.2
December	76	81	71	81	80	5.33	21	10.55	10.1	34.7	3	16	49	17	11	3	1	0	0	1.2	2.3	.3	0	(2)	9	5	64	4.5	3.9
Mean	78	83	73	78	80				9.8		2	10	50	19	14	3	1	1	0										
Total						61.19	214																				64	4.5	4.0
Extremes								10.55		[1] 129.4										9.3	21.8	4.6	0	49	111	67			
Number of years' observations	37			11		37			35	37	18									10	3	3	37	37	37	37	37	32	12

[1] Estimated, anemometer blown away at 117 knots.

[2] Less than 1 day.

[Station: Charlotte Amalie, St. Thomas Island, Virgin Islands. Position: Lat. 18°20′ N., Long. 64°56′ W. Altitude 27 feet]

Month	Air temperature °F.			Rain			Wind										Cloud amount (0–10)	
							Mean velocity (knots)		Percentage of observations [1] from—									
	Mean	Mean maximum	Mean minimum	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	8 a. m.	8 p. m.	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	8 a.m.	8 p.m.
January	77	82	73	2.99	18	1.72	5.8	------	1	30	56	5	1	1	(2)	(2)	6	4.2	------
February	77	81	72	2.21	12	1.60	5.5	------	2	24	55	9	1	2	0	(2)	7	4.0	------
March	78	82	73	2.21	13	1.30	6.0	------	1	17	58	14	3	2	(2)	1	3	4.0	------
April	79	83	75	2.09	11	2.81	4.9	------	(2)	11	58	24	3	0	0	0	3	4.0	------
May	80	85	76	4.60	14	7.28	5.9	------	(2)	5	55	34	4	1	(2)	(2)	2	5.3	------
June	82	86	77	2.91	15	3.41	5.6	6.3	(2)	2	67	28	1	(2)	(2)	0	(2)	6.0	4.6
July	82	87	78	3.68	17	2.75	5.9	7.7	(2)	9	78	12	(2)	(2)	0	0	(2)	5.3	4.8
August	83	88	78	4.42	18	4.65	6.4	7.0	1	14	64	14	4	1	(2)	(2)	1	3.8	3.3
September	83	88	78	6.17	17	10.02	5.4	5.0	1	13	51	22	5	2	(2)	(2)	1	4.4	3.8
October	82	87	77	6.12	16	4.15	4.5	5.3	(2)	15	22	20	4	3	(2)	0	5	4.3	3.7
November	81	85	76	6.25	17	3.55	4.3	4.5	3	24	42	14	2	3	1	2	5	4.8	4.1
December	79	83	74	3.10	18	2.12	5.5	.	1	28	60	5	1	(2)	0	(2)	9	4.0	. .
Mean	80	85	76	------	------	------	5.5	----	1	16	58	18	2	1	(2)	(2)	4	4.5	------
Total	------	------	------	46.75	186	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Extremes	------	------	------	------	------	10.02	------	------	------	------	------	------	------	------	------	------	------	------	------
Number of years [2] observations	19	16	16	17	16	20	5	5	20									4	4

[1] Based on 8 a. m. and 8 p. m. June to November, inclusive; 8 a. m. balance of year.

[2] Less than 0. 5.

Meteorological tables—Continued

[Station: Basseterre, St. Kitts. Position: Lat. 17°18′ N., Long. 62°43′ W. Altitude: 29 feet]

Month	Air temperature °F.			Relative humidity (percent)	Rain			Wind										Number of days with thunderstorms	Cloud amount (0–10)	
										Percentage of observations [1] from—										
	Mean	Mean maximum	Mean minimum	Mean 8 a. m. and 8 p. m.	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	Maximum velocity (knots) 8 a. m.	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm		8 a. m.	8 p. m.
January	76	82	71	76	3.26	17	3.10	7.2	23.4	4	36	49	8	1	(2)	(2)	(2)	(2)	0	4.1	------
February	77	82	71	74	2.03	12	1.98	7.0	29.5	3	31	47	16	(2)	1	(2)	1	(2)	0	3.9	------
March	77	82	72	70	2.41	12	2.50	7.3	20.8	1	26	47	20	2	1	1	1	(2)	0	4.0	------
April	78	83	73	74	2.59	11	2.50	6.6	27.8	(2)	25	41	30	1	1	(2)	(2)	(2)	(3)	3.8	------
May	80	85	75	76	3.04	13	7.45	7.3	23.4	(2)	14	49	33	2	1	0	(2)	(2)	3	6.1	------
June	81	86	76	77	3.27	16	4.60	6.6	29.5	0	18	54	28	(2)	0	(2)	(2)	(2)	3	4.9	5.1
July	81	86	76	76	4.49	18	2.47	7.9	36.5	(2)	32	55	13	(2)	(2)	0	0	0	2	4.6	4.9
August	82	87	77	77	4.81	18	10.60	7.3	62.5	(2)	37	46	12	1	2	(2)	(2)	1	1	4.5	4.1
September	82	87	76	78	6.22	18	7.00	6.0	53.8	1	32	42	16	2	3	1	1	1	4	4.5	4.9
October	81	87	76	78	4.92	18	3.00	5.0	36.5	2	28	45	16	2	3	1	1	2	4	4.4	5.0
November	80	85	74	78	5.60	17	5.02	4.7	29.5	4	37	33	18	2	3	1	1	1	2	4.4	4 3
December	78	83	73	75	3.74	18	2.25	6.4	25.2	2	43	42	12	1	0	0	(2)	(2)	1	4.4	------
Mean	79	85	74	76	------	------	------	6.6	------	1	31	47	19	1	1	(2)	(2)	(2)	------	4.5	------
Total	------	------	------	------	46.38	188	------	------	------	------	------	------	------	------	------	------	------	------	20	------	------
Extremes	------	------	------	------	------	------	10.60	------	62.5	------	------	------	------	------	------	------	------	------	------	------	------
Number of years observations	20			4	20			5	4	20									4	4	4

[1] 8 a. m. and 8 p. m. June to November, inclusive: balance of year 8 a. m. only.

[2] Less than 0.5 percent.

[3] 1 in 4 years.

[Station: St. Johns, Antigua. Position: Lat. 17°06′ N., Long. 61°51′ W. Altitude: 24 feet]

Month	Air temperature °F.			Relative humidity (percent), mean 9 a.m.–3 p.m.	Rain			Wind												Number of days with—				Cloud amount (0–10), mean 9 a.m.–3 p.m.
	Mean	Mean maximum	Mean minimum		Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	Percentage of observations from—											Wind 22 knots or greater	Fog (dense)	Thunderstorms	Visibility less than 1 mile	Ceiling below 1,000 feet	Gales	
									North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm								
January	76	82	70	69	3.25	20	3.3	7.0	1	47	34	15	1	1	0	0	1			0	0	0.2	0	0	0	5.5
February	76	83	70	66	2.24	15	3.2	7.5	1	39	38	18	1	0	1	0	1			0	0	0	0	0	0	5.4
March	77	83	70	64	2.24	14	2.4	7.6	2	38	35	17	1	2	2	2	1			0	0	.2	0	0	0	5.5
April	78	85	71	67	3.20	13	6.1	7.5	1	34	37	25	1	1	0	0	1			0	0	.2	0	.3	0	5.9
May	79	86	73	70	4.26	15	7.1	7.6	1	29	35	31	2	1	0	0	1			.3	0	.8	0	0	0	6.3
June	80	86	74	70	3.97	16	2.5	8.6	0	35	37	26	1	0	0	0	1			.3	0	2.4	0	.3	0	6.3
July	80	87	74	71	4.65	19	5.3	8.9	1	40	42	16	0	0	0	0	1			0	0	2.6	.3	.7	0	6.1
August	81	87	75	70	4.71	18	5.0	7.8	1	36	39	21	1	1	0	0	1			0	0	2.5	.3	.7	.1	6.0
September	81	88	74	72	5.68	18	7.3	5.7	1	31	34	25	2	3	0	1	3			0	0	2.6	0	1.0	.1	6.0
October	80	87	73	72	5.74	19	5.1	4.3	1	26	34	29	2	3	1	1	3			.3	0	3.1	.7	.7	0	6.0
November	79	85	72	73	5.54	19	6.0	5.6	1	32	36	22	2	2	1	1	3			0	0	.6	.3	1.3	0	5.6
December	77	84	71	71	3.90	20	4.7	5.0	1	39	36	19	0	1	0	1	3			.7	0	.2	0	1.7	0	5.5
Mean	79	85	72	70	49.38	206	7.3	7.0	1	36	36	22	1	1	0	1	2	31		3	0	15.4	1.6	6.7	.2	5.8
Total																										
Extremes					50	34	34	11												3	32	11	3	3	26	31
Number of years' observations		37		11																						

Meteorological tables--Continued

[Station: Plymouth, Montserrat. Position: Lat. 16°42′ N., Long. 62°14′ W. Altitude: 130 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind										Number of days with—					Cloud amount (0–10)	
	Mean	Mean maximum	Mean minimum	9 a. m.	3 p. m.	Average amount (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	Percentage of observations from— North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Gales	Fogs	Thunderstorms	Overcast skies	Clear skies	9 a. m.	3 p. m.
January	76	82	70	66	63	4.38	16	1.9	8	3	18	41	30	1	1	0	0	6	0	0	0	2.5	0.5	4.8	4.5
February	76	83	70	62	58	2.66	12	3.1	8	1	14	43	35	2	1	0	0	4	0	.1	0	1.0	.5	4.2	3.7
March	78	85	70	65	61	3.98	12	4.2	7	2	19	36	31	1	3	0	1	7	0	.1	0	2.0	.8	4.2	3.8
April	79	86	72	62	60	2.91	11	1.7	7	3	17	40	29	2	3	0	0	6	0	0	0	3.5	.2	4.4	4.2
May	81	88	74	63	59	3.60	12	1.9	6	2	13	41	30	3	2	0	0	9	0	.2	0	1.2	.5	3.9	4.0
June	82	88	75	66	62	5.04	15	2.3	7	2	11	46	33	1	1	0	0	6	0	.1	0	6.8	.5	5.8	6.0
July	81	87	75	65	62	5.88	18	2.5	9	1	9	42	40	1	1	0	0	6	0	.1	0	5.2	0	5.4	5.8
August	82	88	75	66	63	7.20	19	4.0	8	1	9	41	36	2	1	0	0	10	0	.2	.5	3.5	.2	4.7	5.0
September	82	89	74	64	62	7.08	14	[1] 12.0	5	1	7	31	36	3	3	0	1	18	.1	0	.5	4.2	.2	4.6	4.5
October	80	87	74	64	62	7.17	16	7.6	5	2	9	30	34	3	4	0	0	18	0	0	.8	4.5	2.0	4.8	5.1
November	79	85	73	69	67	6.76	17	4.5	6	2	13	35	32	3	2	0	0	13	0	.1	0	8.0	.5	5.6	5.5
December	78	83	72	67	64	5.30	16	1.6	7	1	14	38	35	1	0	0	0	11	0	0	.2	2.5	.5	4.8	4.5
Mean	80	86	73	65	62				7	2	13	39	33	2	2	0	[2]	9						4.8	4.7
Total						61.96	178																		
Extremes								[1] 12.0											.1	.9	2.0	44.9	6.4		
Number of years' observations	15			4		16		13	10	15									15	15		4		4	

[1] Severe hurricane, rain gage overflowed.
[2] Less than 0.5 percent.

[Station: Camp Jacob, Guadeloupe. Position: Lat. 16°01′ N., Long. 61°42′ W. Altitude: 1,650 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind										Cloud amount (0–10), mean
										Percentage of observations from—									
	Mean	Mean maximum	Mean minimum	7 a. m. mean	5 p. m. mean	Average fall (inches)	Number of rainy days	Maximum fall in 24-hours (inches)	Mean velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	
January	70	77	64	84	82	9.22	23	2.80	7.6	5	19	39	12	3	(1)	0	(1)	22	4.7
February	70	75	63	82	77	6.13	18	2.60	8.4	1	21	43	10	(1)	0	(1)	(1)	25	4.6
March	70	77	63	82	74	8.07	20	5.00	6.8	4	19	41	9	3	0	(1)	0	24	4.6
April	72	79	65	82	76	7.26	20	3.50	8.4	5	16	40	12	(1)	0	(1)	0	27	4.5
May	74	80	67	85	78	11.58	23	5.20	8.4	(1)	19	45	12	0	0	0	0	23	5.7
June	74	80	69	83	76	14.12	24	5.20	11.1	1	20	51	16	0	0	(1)	0	13	5.5
July	74	81	68	83	76	17.58	26	8.50	11.1	3	19	48	12	0	0	0	0	16	5.5
August	75	82	69	83	75	15.27	27	8.70	8.4	4	19	42	12	3	0	(1)	0	20	5.0
September	75	82	69	84	79	16.40	24	9.20	6.0	1	16	38	12	(1)	0	(1)	0	33	4.9
October	75	81	68	83	81	12.41	24	10.30	6.0	1	12	37	12	3	0	0	0	35	4.6
November	73	80	67	83	80	13.25	22	6.60	6.8	5	20	32	9	3	0	(1)	0	31	4.9
December	72	78	65	85	80	10.78	23	4.70	7.6	5	22	37	9	(1)	0	(1)	0	28	4.7
Mean	73	79	66	83	78				8.0	3	18	42	11	1	(1)	(1)	(1)	25	4.9
Total						142.07	274												
Extremes								10.30											
Number of years' observations	21			7	4	21	21	12	10	21									10

[1] Less than 0.5 percent

Meteorological tables—Continued

[Station: Roseau, Dominica. Position: Lat. 15°17′ N., Long. 61°23′ W. Altitude: 25 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind											Number of days with—					Cloud types		Cloud amount (0–10)	
											Percentage of observations from—																	
	Mean	Mean maximum	Mean minimum	8 a. m.	8 p. m.	Average fall (inches)	Number of rainy days	Maximum fall in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Wind 22 knots or more	Fog	Thunderstorms	Clear	Cloudy	8 a. m.	8 p. m.	8 a. m.	8 p. m.
January	78	85	70	72	76	4.74	19	2.34	4.4	17.9	5	26	51	7	1	1	1	2	6	0.2	0	0	10.6	7.0	Cu.	Cu.	4.9	3.6
February	77	85	69	67	70	2.97	15	1.17	4.9	17.7	6	22	53	8	2	1	(1)	2	6	0	0	0	13.7	2.3	Cu.	Cu.	5.1	2.7
March	78	86	70	64	71	2.99	14	2.78	5.6	17.7	5	23	52	9	(1)	1)	1	3	7	0	0	0	11.2	7.2	Cu.	Cu.	5.2	2.8
April	79	87	71	63	70	2.74	12	2.05	5.3	17.8	6	16	47	12	4	2	2	4	6	.7	0	0	14.7	3.7	Cu.	Cu.	4.7	2.0
May	81	88	73	66	71	3.93	16	4.00	4.7	17.6	5	19	41	14	4	2	2	4	9	0	0	1.0	9.7	5.0	Cu.	Cu.	6.1	2.8
June	81	89	74	69	76	7.46	21	3.35	4.3	18.1	5	20	44	17	2	1	1	3	7	.3	0	4.3	4.0	13.2	Cu.	Cu.	6.6	5.3
July	81	89	74	70	76	10.18	24	6.08	4.4	33.0	4	19	53	10	2	1	1	3	7	1.0	0	2.7	7.0	12.0	Cu.	Cu.	6.1	5.6
August	82	89	74	71	77	9.81	23	4.83	4.6	36.5	5	18	50	11	2	1	1	3	9	1.0	0	3.7	7.8	10.0	Cu.	Cu.	5.8	4.7
September	82	90	74	71	79	8.54	21	4.69	4.5	18.1	6	18	43	13	4	3	1	4	8	1.0	0	3.0	6.5	7.2	Cu.	Cu.	5.0	4.7
October	82	90	74	69	79	7.37	19	5.69	4.3	18.0	6	18	45	12	3	1	2	4	8	.7	0	1.7	12.0	6.7	Cu.	Cu.	4.9	4.0
November	81	89	73	74	80	7.23	18	3.83	4.3	32.1	7	21	45	11	2	2	2	4	6	.5	0	1.5	11.5	5.8	Cu.	Cu.	4.5	4.0
December	79	87	71	71	76	5.93	20	2.05	4.3	17.7	5	26	51	6	2	1	1	2	7	0	0	.8	13.0	4.5	Cu.	Cu.	4.8	3.3
Mean	80	88	72	69	75				4.6		6	20	49	11	2	1	1	3	7						Cu.	Cu.	5.3	3.8
Total						73.89	222													5.4	0	18.7	121.7	84.6				
Extremes								6.08		36.5																		
Number of years' observations	20			4	4	38	24	27	4	4	25									4	4	4	5	5	22	6	12	7

[1] Less than 0.5 percent.

[Station: Fort-de-France, Martinique. Position: Lat. 14°36′ N., Long. 61°05′ W. Altitude: 13 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind											Number of days with thunderstorms	Cloud amount (0–10)	
											Percentage of observations from—											
	Mean	Mean maximum	Mean minimum	6 a. m. mean	4 p. m. mean	Average fall (inches)	Number of rainy days	Maximum fall in 24-hours (inches)	Mean velocity (knots) 6 a. m.	Mean velocity (knots) 4 p. m.	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm		6 a. m. mean	4 p. m. mean
January	76	83	69	90	77	4.69	19	2.70	2.1	3.9	29	26	23	6	(1)	0	3	9	3	0.1	4.9	5.5
February	76	84	69	88	73	2.85	15	1.61	1.9	4.3	29	28	25	7	(1)	0	(1)	7	3	.1	5.0	5.2
March	77	85	69	88	72	3.54	15	2.36	2.1	3.9	26	22	27	7	0	0	3	9	6	.2	4.9	5.4
April	79	86	71	88	71	2.86	13	2.06	1.9	3.6	23	26	28	10	(1)	0	(1)	7	6	.1	5.3	5.7
May	80	86	73	88	74	7.20	18	4.37	1.9	3.6	22	19	33	13	3	0	0	3	6	.8	5.5	6.1
June	80	86	74	89	77	7.68	21	3.53	2.1	3.9	20	20	37	13	3	0	0	4	3	2.0	5.8	6.4
July	80	86	74	90	78	9.08	22	4.28	2.1	3.6	20	25	36	10	(1)	0	(1)	6	3	2.9	5.8	6.3
August	81	87	74	91	78	9.83	22	7.82	1.9	3.3	23	23	29	10	3	(1)	0	7	6	3.1	5.6	6.2
September	81	88	74	91	79	9.63	20	6.07	1.6	2.7	23	24	23	10	3	(1)	3	7	6	3.1	5.4	6.4
October	80	87	73	92	80	8.28	19	4.22	1.3	2.4	25	20	20	13	3	(1)	3	6	9	3.3	5.4	6.2
November	79	86	72	92	81	9.18	20	4.84	1.6	2.7	27	23	20	13	(1)	0	3	7	6	1.2	5.4	5.9
December	77	84	70	91	79	6.33	19	3.60	1.9	3.3	29	29	19	7	(1)	0	3	6	6	.6	5.0	5.6
Mean	79	86	72	90	77				1.9	3.4	25	24	27	10	1	(1)	2	6	5		5.3	5.9
Total						81.15	223													17.5		
Extremes								7.82														
Number of years' observations					23				20	20					23					20	19	19

1 Less than 0.5 percent.

Meteorological tables—Continued

[Station: Port Castries, Saint Lucia. Position: Lat. 14°01′ N., Long. 61°00′ W. Altitude: 50 feet]

Month	Air temperature °F.			Relative humidity (percent), mean 7 a. m. and 3 p. m.	Rain			Wind										Number of days with—							Cloud amount (0-10)	
										Percentage of observations from—																
	Mean	Mean Maximum	Mean minimum		Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Clear skies	Cloudy skies	Wind 22 knots or more	Visibility less than 1 mile	Ceiling below 1,000 feet	Thunderstorms	Dense fog	7 a. m.	3 p. m.
January	77	83	71	79	5.97	24	2.39	5.6	17.4	0	22	51	24	0	1	0	0	2	4.4	9.2	1.0	0	1.0	0	0	5.4	
February	77	83	71	76	3.40	21	1.98	5.6	17.4	1	22	54	19	1	0	0	1	2	4.9	4.4	.7	0	.7	0	0	4.9	
March	78	84	72	77	3.88	20	4.83	5.2	15.6	1	20	50	23	2	1	1	1	3	5.9	6.3	2.3	0	1.7	0	0	5.4	
April	79	86	73	77	3.58	19	3.75	5.7	15.6	1	19	53	23	1	1	0	0	1	4.7	6.5	1.0	0	2.0	0	0	5.7	
May	80	87	74	78	5.24	21	2.34	5.6	17.4	1	16	52	29	2	0	0	0	0	2.8	7.9	.3	0	3.7	0.7	0	5.9	
June	80	86	75	80	8.04	24	2.80	5.6	19.1	0	15	63	20	1	0	0	0	1	1.6	12.5	.7	0	2.3	0	0	6.1	7.2
July	81	87	75	78	9.99	27	4.76	5.6	17.4	1	16	57	23	1	0	0	0	1	1.6	12.6	1.3	0	4.7	.3	0	5.9	6.2
August	81	88	74	80	10.71	26	5.06	4.8	21.7	1	17	49	23	3	2	0	1	3	2.9	10.9	0	0	4.7	0	0	5.0	5.6
September	81	88	74	82	9.30	24	3.81	4.4	31.3	1	13	49	26	5	2	0	1	4	4.6	10.3	0	0	2.3	.3	0	5.3	5.4
October	81	87	74	81	9.86	24	8.88	4.3	17.4	1	12	51	27	3	2	0	1	3	4.7	9.2	0	0	1.3	0	0	4.9	5.3
November	80	86	73	83	11.62	24	4.84	4.2	13.9	1	13	54	23	3	2	0	1	4	3.8	8.4	0	0	2.3	.3	0	5.0	4.9
December	78	84	73	82	6.63	25	4.97	5.1	17.4	1	22	54	19	1	1	0	1	3	4.4	8.2	1.0	0	1.3	0	0	5.1	
Mean	79	86	73	79				5.1		1	17	53	23	2	1	0	1	2									
Total					88.22	279																				5.4	
Extremes							8.88		31.3										46.3	106.4	8.3	0	28.0	1.6	0		
Number of years' observations	20			5	20			18	18	20									20	20	3	3	3	3	3	20	20

[Station: Kingstown, St. Vincent. Position: Lat. 13°09′ N., Long. 61°14′ W. Altitude: 80 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind—Percentage of observations from—									Number of days with—			Cloud amount (0–10)	
	Mean	Mean maximum	Mean minimum	9 a. m.	3 p. m.	Average amount (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Clear skies	Overcast skies	Thunderstorms	9 a. m.	3 p. m.
January	78	82	73	72	70	5.94	24	2.15	3	36	10	38	1	2	1	2	7	1.6	3.9	0	5.7	5.4
February	77	81	73	72	70	4.13	20	4.81	2	37	11	35	5	2	1	2	5	1.8	4.1	0	5.7	5.5
March	78	83	73	71	69	3.63	19	1.70	2	33	12	37	2	3	2	3	6	1.3	4.8	0	5.7	5.7
April	79	84	75	72	69	3.79	18	2.29	3	30	13	43	1	2	1	1	6	.7	3.2	0	6.2	5.6
May	80	85	76	74	69	5.30	20	3.52	2	28	15	44	2	2	1	2	4	.8	6.8	.1	6.4	6.2
June	80	84	76	76	74	9.08	26	3.43	2	32	12	45	2	1	1	2	3	.4	8.6	1.6	6.7	7.1
July	80	85	76	77	75	10.18	26	3.02	2	28	12	45	1	2	1	3	6	.8	9.2	1.0	6.5	6.6
August	81	86	76	75	73	10.43	26	3.61	3	27	13	43	2	3	1	2	6	.6	7.4	.9	6.1	6.2
September	81	86	76	75	74	10.44	23	7.97	2	27	16	41	1	3	1	1	8	.2	7.9	1.5	6.8	6.7
October	81	86	76	74	75	11.81	24	5.28	2	26	15	40	2	2	1	1	11	.8	9.1	1.3	6.8	6.9
November	80	85	75	75	74	10.89	25	6.88	2	26	14	42	2	2	1	2	9	.8	7.3	.8	6.4	6.7
December	79	83	74	73	71	6.27	22	3.04	3	34	11	38	2	2	1	1	8	1.1	6.4	.3	6.1	5.9
Mean	80	84	75	74	72				2	30	13	41	2	2	1	2	7				6.3	6.2
Total						91.89	273											10.9	78.7	7.5		
Extreme								7.97														
Number of years' observations	13					24												12		10	13	

Meteorological tables—Continued

[Station: Bridgetown, Barbados. Position: Lat. 13°06′ N., Long. 59°37′ W. Altitude: 30 feet]

Month	Air temperature ° F.			Relative humidity (percent)		Rain			Wind—											Number of days with—				Cloud amount (10–10)	
											Percentage of observations from—															
	Mean	Mean maximum	Mean minimum	9 a. m.	3 p. m.	Average fall (inches)	Number of rainy days	Maximum fall in 24-hour (inches)	Mean velocity (knots) 9 a. m.	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Gales	Fog	Overcast	Thunderstorms	9 a. m.	3 p. m.
January	77	84	70	69	66	2.22	19	1.25	9.8	24.3	1	12	73	10	0	0	(1)	1	4	0	0	4.3	0	6.9	7.1
February	78	86	70	68	64	1.16	12	1.19	10.5	23.4	(1)	13	70	9	(1)	0	0	0	8	0	0	4.1	0	6.9	7.0
March	79	87	71	66	63	1.08	11	1.93	10.6	21.7	1	10	73	15	1	0	0	0	1	0	0	4.9	0	7.0	7.0
April	80	88	73	65	61	1.40	11	2.67	10.2	20.8	(1)	8	65	24	2	0	0	0	(1)	0	0	6.1	1	7.6	7.2
May	82	89	74	65	62	1.79	12	2.50	10.5	24.3	0	2	68	29	(1)	0	(1)	0	0	0	0	5.7	5	7.6	7.2
June	82	88	75	69	67	4.13	18	2.05	11.0	24.3	(1)	1	75	22	1	0	0	(1)	1	0	0	9.1	9	7.7	7.5
July	81	88	74	72	68	4.68	19	1.69	10.2	31.3	(1)	5	77	15	1	0	0	0	1	0	0	8.9	11	7.7	7.4
August	81	88	74	72	70	6.12	19	4.56	8.6	45.2	1	8	62	16	5	(1)	(1)	(1)	7	0	0	6.8	19	7.6	7.4
September	81	89	74	72	70	6.57	16	4.16	6.9	53.8	2	9	55	21	4	1	1	1	6	(2)	0	7.3	17	7.7	7.3
October	81	88	73	73	72	6.58	17	5.39	6.4	29.7	1	8	57	17	4	(1)	(1)	(1)	14	0	0	8.3	15	7.6	7.2
November	80	87	73	73	72	6.79	17	6.56	7.3	24.3	(1)	4	61	18	3	(1)	0	0	14	0	0	6.1	1	7.3	7.2
December	78	85	71	72	69	2.87	17	2.27	8.5	21.7	(1)	11	71	9	1	0	0	0	8	0	0	5.1	3	7.1	7.1
Mean	80	87	73	70	67				9.2		1	8	67	17	2	(1)	(1)	(1)	5					7.4	7.2
Total						45.39	188													(2)	0	76.7	81		
Extremes								6.56		53.8															
Number of years' observations	20			31		20			23	5	20									23	23	14	5	14	14

[1] Less than 0.5 percent.

[2] 1 reported in 1899.

[Station: Grenada (Richmond Hill). Position: Lat. 12°05′ N., Long. 61°46′ W. Altitude: 507 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind											Number of days with—					Prevailing upper cloud type	Direction from which upper clouds most frequently move	Cloud amount (0–10)	
	Mean	Mean maximum	Mean minimum	9 a. m. mean	6 p. m. mean	Average fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)	Mean velocity (knots) 6 p. m. to 9 a. m.	Mean velocity (knots) 9 a. m. to 6 p. m.	Percentage of observations from—									Gales	Fog	Thunderstorms	Clear skies	Cloudy skies			9 a. m. mean	6 p. m. mean
											North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm									
January	76	82	72	74	76	4.68	20	3.56	6.2	5.9	4	30	37	12	1	1	1	1	14	0.2	0	(1)	19.3	7.3	Ci. Cu.	E.	3.7	3.7
February	76	82	72	74	74	2.73	16	2.10	6.6	6.5	3	28	41	10	1	1	3	3	11	.1	0	(1)	18.8	6.1	Ci. Cu.	E.	3.5	3.4
March	77	83	72	72	73	2.67	15	1.40	7.5	7.1	3	26	41	12	1	1	3	4	10	.1	0	(1)	15.5	7.5	Ci. Cu.	E,	3.5	3.5
April	78	84	74	72	74	2.21	13	1.70	7.0	7.3	3	24	41	17	1	2	1	2	9	.1	0	0.2	20.0	5.4	Ci. St.	E.	3.8	3.9
May	79	85	75	73	75	4.38	17	3.50	7.3	7.3	3	23	43	20	1	1	1	1	9	.3	0	.3	19.7	7.9	Ci. Cu.	E.	4.6	4.0
June	78	84	74	78	78	8.49	23	2.90	6.5	6.6	2	23	44	20	2	1	0	2	7	.2	0	1.3	13.1	12.7	Ci. St.	E.	5.2	5.7
July	78	84	74	78	78	9.36	25	3.70	6.0	6.2	2	21	45	17	1	1	0	2	12	.1	0	1.5	15.4	11.9	Ci. Cu.	E.	4.8	4.4
August	79	85	75	78	77	8.99	23	4.50	5.6	5.6	2	19	39	19	2	1	1	2	16	(1)	0	2.5	16.9	10.4	Ci. Cu.	E.	4.5	4.4
September	79	85	75	77	78	8.21	20	4.20	5.4	5.6	1	16	36	27	1	1	2	1	17	.2	0	3.1	18.7	8.3	Ci. Cu.	E.	4.4	4.1
October	79	85	75	77	79	8.15	19	4.30	5.4	5.6	2	15	36	28	3	1	1	1	14	.2	0	2.5	17.9	8.2	Ci. Cu.	E.	4.4	4.1
November	78	84	74	77	79	8.56	21	5.50	5.4	5.7	1	17	41	19	2	1	2	2	16	.2	0	1.1	16.9	9.5	Ci. Cu.	E.	4.4	4.7
December	77	83	73	76	78	7.24	21	3.10	5.5	5.7	4	24	38	12	2	1	1	4	15	.1	0	.2	19.4	7.1	Ci. Cu.	E.	3.9	4.2
Mean	78	84	74	76	77				6.2	6.3	2	22	40	18	2	1	1	2	12								4.2	4.2
Total						75.67	233													1.8	0	12.7	211.6	102.3				
Extremes								5.50																				
Number of years' observations	45			44	24	44	44	39	10		44									24	28	24	18	18	3	3	44	24

[1] Less than 0.5 day.

Meteorological tables—Continued

[Station: Port-of-Spain, Trinidad. Position: Lat. 10° 39′ N., Long. 61° 31′ W. Altitude: 40 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind											Number of days with—							Sunshine, hours mean daily duration	Cloud amount (0–10)	
									Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations from—																		
	Mean	Mean maximum	Mean minimum	8 a. m.	8 p. m.	Average Fall (inches)	Number of rainy days	Maximum fall in 24 hours (inches)			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Thunderstorms	Clear skies	Cloudy skies	Wind 22 knots or more	Visibility less than 1 mile	Ceilings below 1,000 feet	Dense fog		8 a. m.	8 p. m.
January	78	85	71	76	78	2.34	14	2.67	3.6	14.8	7	21	29	28	4	3	1	2	4	0.1	4	6	0	0	2.0	0	6.6	3.7	3.7
February	78	86	71	71	76	1.18	8	2.70	4.3	17.1	4	17	30	34	5	4	1	2	2	0	8	3	0	1.0	1.0	0	7.7	3.9	1.8
March	79	87	71	71	78	1.43	8	1.80	4.2	15.6	2	19	29	33	8	5	1	2	1	0	3	12	0	0	.3	0	7.0	4.4	3.2
April	80	88	73	68	76	1.26	7	2.36	4.9	15.9	1	9	42	35	9	2	(1)	1	(1)	.3	9	8	.2	0	2.0	0	6.7	5.8	2.3
May	81	88	74	71	79	2.82	10	2.79	4.9	16.5	(1)	4	45	40	4	5	1	(1)	1	1.2	9	10	0	.7	3.7	0	6.6	4.5	2.9
June	80	87	74	78	84	6.37	17	2.09	3.8	14.8	3	10	44	31	4	4	2	2	1	4.2	4	16	0	1.0	3.0	0	6.1	5.0	4.0
July	80	87	72	77	83	7.75	20	2.94	3.6	17.4	5	15	41	26	6	4	1	1	2	4.0	5	11	0	.7	2.7	0	5.9	3.7	3.2
August	80	87	73	82	84	7.63	21	2.81	3.1	16.1	8	18	34	25	4	3	2	3	2	5.8	4	10	.3	1.0	5.0	0	5.8	3.7	4.6
September	80	88	73	80	81	6.92	18	3.13	3.4	15.2	5	14	38	30	4	3	1	2	3	6.3	5	10	0	.3	2.3	0	5.5	3.2	4.2
October	80	88	73	78	82	5.57	16	3.01	3.3	15.5	5	15	36	30	5	4	1	3	2	5.3	4	10	0	.0	1.7	0	6.1	3.6	4.2
November	80	87	73	79	84	6.51	17	3.06	3.2	17.2	5	16	38	29	4	3	2	1	2	3.6	4	12	.3	.7	3.7	0	6.7	3.8	4.4
December	79	86	72	78	82	4.68	16	2.42	3.2	14.8	6	20	26	29	7	4	1	3	3	5.7	5	10	0	0.3	2.0	0	6.7	4.2	3.6
Mean	80	87	72	76	81				3.8		4	15	36	31	5	4	1	2	2								6.4	4.1	3.5
Total						54.46	172																						
Extremes								3.13		17.4										36.5	64	118	.8	5.7	29.4	0			
Number of years' observations	31			4		32	29	32	4	4	25									7	4	4	7	3	3	3	8	13	7

[1] Less than 0.5 percent.

[Station: Williamstad, Curacao. Position: Lat. 12°06′N., Long. 68°56′ W. Altitude: 75 feet]

Month	Air temperature °F.			Relative humidity (percent)		Rain			Wind											Number of days with—			Percent possible sunshine	Cloud amount (0–10)		
											Percentage of observations from—															
	Mean	Mean maximum	Mean minimum	8 a. m. mean	2 p. m. mean	Average amount (inches)	Number of rainy days	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Thunderstorms	Clear skies	Cloudy skies		8 a. m. mean	2 p. m. mean	6 p. m. mean
January	79	83	75	77	69	2.07	14	1.68	9.6	23.4	0	10	84	5	0	0	0	0	1	0	7.5	4.5	64	4.4	4.1	4.3
February	79	84	74	78	68	.95	8	.82	10.9	25.2	0	10	83	6	0	0	0	0	1	0	9.6	5.0	71	4.4	3.9	4.0
March	79	84	74	76	66	.84	7	1.92	11.0	24.3	0	17	79	4	0	0	0	0	(1)	0	9.0	5.8	65	4.3	3.7	3.8
April	81	86	76	76	67	1.07	4	1.07	11.3	26.0	(1)	14	77	8	(1)	1	0	0	0	0	8.2	5.2	62	4.9	4.0	4.2
May	82	86	77	76	68	.76	4	1.72	11.9	25.2	(1)	7	83	10	(1)	0	0	0	0	.7	7.7	3.8	64	5.0	3.8	4.2
June	82	87	78	76	68	.95	7	1.89	11.9	24.3	0	6	82	12	0	0	0	0	(1)	.7	7.3	4.5	63	5.3	4.2	4.5
July	82	87	77	77	68	1.47	9	1.57	10.9	26.0	0	8	80	12	(1)	0	0	0	(1)	1.6	7.8	5.2	60	5.2	4.1	4.3
August	83	88	78	77	67	1.22	8	2.38	10.6	24.3	(1)	9	77	13	1	(1)	0	(1)	(1)	2.0	7.8	6.1	69	4.8	3.7	4.0
September	83	89	78	77	67	1.12	6	3.64	9.8	34.7	1	11	68	18	1	(1)	(1)	0	1	3.0	9.2	5.4	70	5.0	3.9	4.4
October	83	88	78	77	70	4.20	9	5.13	8.0	26.0	1	9	68	18	2	1	(1)	(1)	1	3.5	9.1	5.9	63	5.1	4.4	4.8
November	81	86	76	79	72	4.43	15	6.24	8.0	24.3	1	16	73	6	1	(1)	(1)	1	2	2.6	3.8	6.0	57	5.2	4.8	5.0
December	79	84	75	78	71	3.85	16	2.79	8.8	22.6	1	13	80	5	0	0	0	0	1	.2	4.4	5.5	65	4.5	4.4	4.5
Mean	81	86	76	77	68				10.2		(1)	11	78	10	(1)	(1)	(1)	(1)	1				64	4.8	4.1	4.3
Total						22.93	107													14.3	90.4	62.9				
Extreme								6.24		34.7																
Number of years' observations	32			24		70	40	23	5		8									5			15	24		

[1] Less than 0.5 percent.

[Station: Caripito, Venezuela. Position: Lat. 10°09′ N. Long. 63°06′ W. Length of record: 3 years]

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Prevailing wind direction	E.	NE.	NE.	NE.	NE.	E.	E.	NE.	E.	E.	E.	E.	E.
Average hourly wind velocity, knots	5.5	5.0	5.8	5.5	5.2	5.0	5.5	5.8	5.8	4.1	4.1	4.1	5.1
Number of days with wind 22 knots or more	0	0	0	0	0	0	.3	.7	0	0	0	0	1.0
Number of days with wind 28 knots or more	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of days with visibility less than 1 mile	.3	0	0	0	0	.3	0	3.0	1.3	.7	0	0	5.6
Number of days with ceiling below 1,000 feet	3.3	1.0	1.3	1.7	5.0	8.7	17.0	17.3	11.0	9.0	7.3	5.3	87.9
Number of days with dense fog	0	0	0	0	0	0	0	0	.7	.3	0	0	1.0
Number of days with thunderstorm	0	0	0	0	3.7	3.3	10.0	8.7	8.0	7.3	5.7	0.7	47.4
Number of days with precipitation of 0.01 inch or more	16.3	12.3	10.0	3.7	16.0	18.7	23.3	19.0	15.0	12.3	17.3	22.3	186.2

[Station: La Guaira, Venezuela. Position: Lat. 10°36′ N., Long. 66°58′ W. Length of record: 3 years]

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Prevailing wind direction	NE.	NE.	NE.	NE.	NE.	NE.	NE.	NE.	NE.	NE.	NE.	NE.	NE.
Average hourly wind velocity, knots	7.0	6.1	7.2	8.4	7.6	7.6	7.2	7.0	7.2	6.7	5.5	5.2	6.9
Number of days with wind 22 knots or more	0	0	0	0	0	0	0	0	0	.3	0	0	.3
Number of days with wind 28 knots or more	0	0	0	0	0	0	0	0	0	.3	0	0	.3
Number of days with visibility less than 1 mile	.3	1.3	0	0	.7	0	0	0	0	0	0	0	2.3
Number of days with ceiling below 1,000 feet	.3	1.7	2.0	3.0	4.0	5.0	3.0	1.3	1.3	0	1.0	1.3	23.9
Number of days with dense fog	.3	0	0	0	0	0	0	0	0	0	0	0	.3
Number of days with thunderstorm	0	0	.3	0	0	0	0	0	0	0	0	0	.3
Number of days with precipitation of 0.01 inch or more	1.3	1.7	.7	0	1.0	2.0	3.3	2.3	2.3	3.3	7.0	2.3	27.2

[Station: Caracas, Venezuela. Position: Lat. 10°30′ N., Long. 66°55′ W. Altitude: 3,420 feet]

Month	Air temperature, °F.			Relative humidity (percent), mean daily	Rain			Wind (3 observations per day)										Cloud amount (0–10), mean daily
									Percentage of observations from—									
	Mean	Mean maximum	Mean minimum		Average amount (inches)	Number of rainy days	Maximum in 24 hours (inches)	Mean velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	
January	65	75	56	78	0.89	6	1.59	5.2	0	0	54	9	3	1	32	1	0	5.2
February	65	77	56	76	.37	2	1.17	6.0	0	(1)	46	8	4	(1)	40	1	0	4.9
March	66	78	57	76	.55	3	1.42	6.6	0	0	42	8	3	0	45	2	0	5.8
April	68	80	60	76	1.29	4	2.90	5.8	0	(1)	51	6	3	(1)	38	2	0	7.2
May	69	80	62	77	3.06	9	3.11	5.8	0	0	57	12	5	(1)	25	1	0	7.9
June	69	78	62	80	3.97	14	2.77	6.2	0	(1)	67	18	6	(1)	9	(1)	0	8.4
July	68	77	61	80	4.32	15	2.79	5.8	0	(1)	69	20	5	0	6	0	0	7.9
August	68	78	61	80	4.31	15	2.59	5.1	0	0	71	13	5	0	11	(1)	0	7.5
September	68	79	61	80	4.17	13	3.28	4.7	0	0	70	12	4	0	13	1	0	7.1
October	68	79	61	81	4.28	12	3.19	4.7	0	0	61	12	4	(1)	22	1	0	6.9
November	67	77	60	82	3.73	13	2.38	4.9	0	0	55	8	3	(1)	33	1	0	7.1
December	65	75	58	81	1.84	10	1.85	4.9	(1)	0	57	9	4	(1)	29	1	0	6.1
Mean	67	78	60	79				5.5	(1)	(1)	58	11	4	(1)	26	1	0	6.8
Total					32.78	116												
Extreme							3.28											
Number of years' observations	35	22		35	46		40	28	21									34

[1] Less than 0.5 percent.

Meteorological tables—Continued

[Station: Maracaibo, Venezuela. Position: Lat. 10°38′ N., Long. 71°37′ W. Altitude: 26 feet]

Month	Air temperature °F.			Relative humidity (percent), daily mean	Rain			Wind										Number of days with—				
										Percentage of observations from—												
	Mean	Mean maximum	Mean minimum		Average amount (inches)	Number of rainy days	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Wind of 22 knots or over	Ceiling below 1,000 feet	Visibility 1 mile or less	Dense fog	Thunderstorms
January	81	88	74	75	0.12	(1)	1.21	4.0	(2)	34	28	10	5	7	0	1	1	14	0	0.2	0.2	0	0
February	82	89	75	75	.03	(1)	.11	4.5	(2)	46	30	9	4	5	0	0	0	6	.2	0	0	0	0
March	83	90	76	70	.30	1	1.40	4.3	(2)	44	29	9	2	3	1	0	1	11	0	.8	.2	0	.2
April	84	91	77	74	.53	1	1.03	4.7	(2)	39	28	5	5	5	1	0	1	16	0	.2	0	0	.5
May	84	91	78	77	2.50	6	2.72	3.9	(2)	19	19	5	9	13	5	2	1	27	0	.2	.2	0	2.2
June	85	92	78	78	2.50	6	3.27	3.2	34.7	18	13	8	8	16	4	2	1	30	.8	3.0	.8	0	4.0
July	85	92	78	75	2.17	5	2.69	4.4	52.1	14	13	13	14	14	3	1	2	26	1.0	2.5	1.2	0	8.8
August	85	92	78	78	2.40	7	2.58	4.2	39.1	11	19	14	13	16	2	1	0	24	.5	2.7	1.2	0	5.2
September	84	91	78	81	3.04	6	3.36	3.7	39.1	10	11	7	11	16	2	1	1	41	1.2	1.2	1.0	0	6.0
October	82	88	77	83	4.77	9	3.16	3.7	(2)	13	10	7	7	17	1	1	0	44	.8	5.5	2.5	0	7.8
November	82	87	77	83	3.28	8	4.36	4.2	(2)	18	15	8	9	11	1	1	2	35	.8	4.8	1.5	0	3.8
December	82	88	76	78	.62	2	.95	3.7	(2)	25	27	13	7	9	1	0	0	18	0	1.2	.2	0	1.0
Mean	83	90	77	77				4.1		24	20	9	8	11	2	1	1	24					
Total					22.26	51													5.3	22.3	9.0	0	39.5
Extreme							4.36		52.1														
Number of years' observations	15			14	22	8	15	6	4	7									4				

[1] Less than than ½ day.

[2] Less than 26 knots.

[Station: Barranquilla, Colombia. Position: Lat. 10°58′ N., Long. 74°47′ W.]

Month	Rain		Wind			Number of days with—				
	Average amount (inches)	Number of rainy days	Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations from prevailing direction	Wind 22 knots or higher	Ceiling below 1,000 feet	Visibility 1 mile or less	Dense fog	Thunderstorms
January	0	0	12.0	30.4	ENE.	5.2	0	0	0	0
February	.02	(1)	11.3	33.0	ENE.	4.0	0	0	0	0
March	0	0	12.8	33.0	ENE.	6.2	0	0	0	0
April	.43	1	9.6	26.0	ENE.	1.2	0	0	0	0
May	2.67	5	6.5	(2)	NE.	3.0	0	0	0	4.2
June	5.16	8	5.6	30.4	NE.	4.5	.2	.2	.2	7.2
July	1.90	6	7.4	(2)	NE.	1.8	0	.2	.2	2.8
August	6.12	7	6.5	(2)	NE.	2.0	0	0	0	5.0
September	5.72	11	5.6	(2)	E.	2.5	0	0	0	7.8
October	9.43	12	5.2	(2)	ENE.	3.0	.2	.5	.5	7.5
November	4.39	6	7.6	26.0	NE.	1.2	.5	.8	.8	2.0
December	.27	5	10.2	(2)	NE.	3.8	0	0	0	0
Mean			8.4							
Total	36.11	61				38.4	.9	1.7	1.7	36.5
Extreme				33.0						
Number of years' observations	11					4				

[1] Less than ½-day.

[2] Less than 26 knots.

Station: Cartagena, Colombia. Position: Lat. 10°26′ N., Long. 75°33′ W. Altitude: 16 feet]

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Average monthly precipitation (12 years, 1892–1903)	0	0.01	0.07	0.55	3.39	5.06	2.80	4.96	5.20	8.78	4.46	0.36	35.64
Average number of days with rain (12 years, 1892–1903)	0	(1)	(1)	1	6	7	5	8	7	9	5	1	49

[1] Less than 0.5 day.

Meteorological tables—Continued

[Station: Turbo Colombia. Position: Lat. 8°05′ N., Long. 76°46′ W.]

Month	Rain		Wind			Number of days with—				
	Average amount (inches)	Number of rainy days	Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations from prevailing wind direction	Wind of 22 knots or over	Ceiling less than 1,000 feet	Visibility less than 1 mile	Dense fog	Thunderstorms
January	0.05	1	7.4	(1)	NNW.	0	2.0	0	0	0
February	2.48	1	9.1	(1)	NNW.	3.5	0	0	0	0
March	0	0	7.8	(1)	N.	16.0	3.0	0	0	0
April	3.17	4	7.0	(1)	NNW.	1.0	5.0	.5	.5	0
May	15.23	20	5.6	(1)	SW.	0	7.0	0	0	.5
June	7.58	10	7.4	(1)	SSW.	0	4.0	0	0	.5
July	9.17	8	5.6	(1)	SSW.	1.0	5.0	0	0	0
August	9.52	10	6.1	(1)	SSW.	1.5	4.5	0	0	.5
September	8.56	10	6.1	26.0	S.	3.5	4.5	.5	0	2.0
October	7.10	6	7.4	30.4	SW.	3.0	5.0	0	0	.5
November	12.84	12	5.2	(1)	S.	1.5	5.0	0	0	0
December	5.62	5	9.1	(1)	NNW.	2.0	5.0	0	0	0
Mean			7.0							
Total	81.32	87				33.0	50.0	1.0	.5	4.0
Extreme				30.4						
Number of years' observations	2									

[1] Less than 26 knots.



CHART 37.—Ocean areas for surface meteorological tables. The number in each 5° square is the number of the table for that area.

Meteorological tables—Continued

[Ocean areas (Bermuda): 3060–3065. Position: Lat. 30° to 35° N., Long. 60° to 70° W. Years covered, 1880–1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunder-storms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	4,493	15.5	12	9	6	7	14	17	18	16	1	3	1	(1)	1	6	5	(1)	1	15	8	6.0
February	4,150	16.8	10	7	4	7	14	17	20	20	1	4	1	(1)	2	7	6	1	1	17	9	6.2
March	4,180	15.2	12	8	5	7	13	20	16	18	1	4	1	(1)	1	6	5	1	1	14	9	5.7
April	3,609	13.5	13	9	6	8	14	19	14	16	1	5	2	1	1	4	3	1	(1)	9	9	5.4
May	3,158	10.0	9	9	8	12	19	21	11	9	2	6	1	(1)	1	3	3	(1)	(1)	2	11	5.0
June	2,801	9.3	4	6	7	11	19	32	12	6	3	5	1	(1)	1	3	4	1	(1)	1	13	4.8
July	3,023	8.9	2	4	8	13	21	32	12	5	3	3	(1)	(1)	1	3	6	1	(1)	1	14	4.4
August	2,991	8.9	4	6	7	13	19	28	13	6	4	3	(1)	0	(1)	4	5	1	(1)	2	15	4.4
September	3,097	10.0	11	14	12	14	13	15	10	8	3	2	1	(1)	1	4	6	1	(1)	4	13	4.8
October	3,580	12.8	14	17	12	11	11	12	10	12	1	2	1	(1)	1	5	6	1	(1)	7	11	5.4
November	3,806	13.8	14	15	9	9	10	12	13	17	1	2	1	(1)	1	5	5	(1)	(1)	10	10	5.5
December	4,123	14.8	13	10	6	7	11	16	16	20	1	2	2	(1)	1	5	6	(1)	(1)	12	10	6.0
Mean		12.5	10	9	7	10	15	20	14	13	2	3	1	(1)	1	5	5	1	(1)	8	11	5.3
Total	43,011																					

[1] Less than 0.5 percent.

[Ocean area: 2070. Position: Lat. 20° to 25° N., Long. 70° to 75° W. Years covered, 1880–1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	2,807	12.0	8	36	32	10	4	2	2	5	1	2	(1)	(1)	(1)	2	4	(1)	0	3	8	4.5
February	2,417	10.6	9	30	32	13	5	3	3	3	2	1	(1)	(1)	1	2	3	(1)	(1)	2	9	4.2
March	3,013	10.6	10	28	31	13	5	3	3	5	2	3	(1)	(1)	(1)	2	2	(1)	0	1	8	4.0
April	2,980	10.2	7	30	34	13	4	3	3	4	2	2	(1)	(1)	(1)	2	3	(1)	(1)	1	8	4.1
May	2,961	8.9	5	24	36	18	7	3	1	3	3	2	1	(1)	1	3	3	1	(1)	(1)	7	4.7
June	3,184	9.7	2	17	47	24	6	1	(1)	1	2	3	(1)	(1)	(1)	2	4	1	(1)	1	7	4.6
July	3,418	11.1	1	19	54	22	2	1	(1)	(1)	1	2	(1)	(1)	(1)	1	3	1	(1)	1	8	4.2
August	3,237	10.2	2	21	50	18	2	4	1	1	1	2	(1)	(1)	(1)	1	3	1	(1)	1	9	4.1
September	3,155	9.3	3	24	43	18	5	2	1	2	2	1	(1)	(1)	(1)	2	4	1	(1)	2	9	4.4
October	3,108	9.3	6	26	34	15	6	4	3	3	3	1	(1)	(1)	(1)	3	5	1	(1)	1	8	4.7
November	2,789	11.6	10	41	28	8	3	2	3	3	2	3	(1)	(1)	(1)	3	5	(1)	(1)	3	8	4.9
December	2,780	11.6	9	38	31	9	3	2	2	4	2	2	(1)	(1)	(1)	2	5	(1)	(1)	3	9	4.4
Mean		10.4	6	28	38	15	4	2	2	3	2	2	(1)	(1)	(1)	2	4	1	(1)	2	8	4.4
Total	35,849																					

[1] Less than 0.5 percent.

Meteorological tables—Continued

[Ocean area: 2075. Position: Lat. 20° to 25° N., Long. 75° to 80° W. Years covered 1880–1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	535	11.6	13	35	30	8	3	2	3	4	2	3	(1)	(1)	1	2	3	(1)	0	3	12	4.7
February	547	10.2	12	28	31	11	6	2	3	6	1	3	1	0	1	1	3	(1)	0	2	10	4.3
March	700	10.2	11	37	27	9	3	3	3	4	3	4	1	0	0	1	3	(1)	(1)	3	8	3.9
April	662	9.7	9	30	30	10	4	4	4	5	4	2	2	(1)	(1)	(1)	4	0	0	2	7	4.2
May	527	8.0	5	21	41	15	4	5	2	3	4	2	2	(1)	(1)	2	5	1	(1)	1	8	4.5
June	521	8.0	2	17	48	17	4	4	2	1	5	3	1	(1)	(1)	3	5	1	0	1	8	4.5
July	587	9.3	2	19	50	16	6	2	1	2	2	4	1	(1)	(1)	2	2	2	0	1	11	4.4
August	469	9.3	4	21	48	13	5	3	1	1	4	3	(1)	0	0	1	3	2	0	1	10	4.2
September	512	8.0	3	21	37	19	7	4	2	2	5	2	1	1	(1)	2	4	2	(1)	2	11	4.5
October	552	8.9	9	23	30	16	6	6	3	3	4	1	1	1	1	3	4	1	0	3	11	4.7
November	466	11.6	15	42	24	5	1	2	2	6	3	2	1	(1)	1	4	5	(1)	(1)	5	8	4.6
December	502	12.0	16	42	26	3	2	3	2	5	1	2	1	1	1	3	1	0	0	2	11	4.4
Mean		9.7	9	28	35	12	4	3	2	4	3	3	1	(1)	(1)	2	4	1	(1)	2	10	4.4
Total	6,580																					

[1] Less than 0.5 percent.

[Ocean area: 2080. Position: Lat. 20° to 25° N., Long. 80° to 85° W. Years covered 1880–1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunder-storms	Heavysqualls	Gales (force 7 or over)	Exceptional visibility	
January	5,099	11.1	16	27	25	13	5	2	3	8	1	3	1	(1)	1	2	2	(1)	(1)	3	11	4.7
February	4,808	10.6	16	21	26	17	7	3	3	7	2	5	1	(1)	(1)	1	2	(1)	(1)	2	11	4.4
March	5,089	10.2	15	21	27	17	7	2	2	7	2	5	1	(1)	(1)	1	1	(1)	(1)	2	10	3.5
April	5,037	9.7	11	22	31	16	6	2	3	6	3	5	1	(1)	(1)	1	1	(1)	(1)	1	11	3.8
May	5,167	8.0	6	19	35	18	7	4	3	4	4	3	(1)	(1)	(1)	2	2	1	(1)	1	12	4.1
June	5,207	7.2	3	15	40	23	8	4	2	2	3	2	1	(1)	(1)	3	3	1	(1)	1	13	4.1
July	5,468	6.8	2	14	44	22	7	4	1	2	4	2	(1)	(1)	(1)	1	3	1	(1)	(1)	13	4.0
August	5,344	7.2	3	16	41	21	8	4	2	1	4	2	(1)	(1)	(1)	2	4	1	(1)	1	14	4.3
September	5,455	8.0	5	20	37	18	9	4	2	2	3	2	(1)	(1)	(1)	3	4	1	(1)	2	14	4.9
October	6,040	10.6	13	31	29	10	4	3	3	5	2	2	(1)	(1)	1	5	4	(1)	(1)	3	12	4.8
November	5,604	12.5	20	38	24	6	2	1	2	6	1	3	1	(1)	1	3	4	(1)	(1)	3	12	4.7
December	5,200	11.1	18	27	27	12	4	2	2	7	1	3	1	(1)	(1)	2	2	(1)	(1)	2	12	4.5
Mean		9.4	11	23	32	16	6	3	2	5	2	3	1	(1)	(1)	2	3	(1)	(1)	2	12	4.3
Total	63,518																					

[1] Less than 0.5 percent.

Meteorological tables—Continued

[Ocean area: 1560. Position: Lat. 15° to 20° N., Long. 60° to 65° W. Years covered: 1880–1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	1,225	13.0	5	50	36	6	1	(1)	(1)	1	1	1	1	(1)	1	3	8	(1)	(1)	4	9	4.3
February	1,112	12.0	5	43	40	8	2	(1)	1	1	(1)	2	1	(1)	(1)	2	6	(1)	(1)	2	10	4.2
March	1,299	11.6	7	41	36	9	2	1	1	2	1	1	1	(1)	1	2	6	0	(1)	2	10	4.1
April	1,154	11.6	3	34	44	13	2	(1)	1	1	2	2	1	(1)	(1)	3	6	(1)	0	1	11	4.3
May	1,210	11.6	1	26	50	18	3	1	(1)	(1)	1	2	(1)	(1)	(1)	2	5	(1)	(1)	1	10	4.5
June	1,027	13.0	1	26	59	13	1	(1)	(1)	(1)	(1)	5	1	(1)	(1)	3	7	1	0	3	9	4.5
July	1,048	14.0	1	36	54	8	(1)	1	(1)	(1)	(1)	4	1	(1)	(1)	3	8	1	0	3	12	4.5
August	1,068	13.0	2	40	46	8	2	1	(1)	(1)	1	4	1	0	(1)	4	8	2	(1)	3	8	4.5
September	1,014	10.2	2	28	44	16	4	2	1	1	2	1	(1)	(1)	(1)	3	8	1	(1)	2	13	4.5
October	1,178	9.7	3	28	44	16	4	2	(1)	1	2	1	(1)	(1)	(1)	3	6	1	(1)	1	11	4.3
November	1,120	10.6	2	39	40	10	3	1	1	1	3	2	(1)	0	(1)	4	8	1	(1)	2	9	4.3
December	1,196	12.0	6	48	36	6	1	(1)	1	1	1	2	(1)	1	1	3	8	(1)	(1)	1	10	4.2
Mean		11.9	3	36	44	11	2	1	1	1	1	2	1	(1)	(1)	3	7	1	(1)	2	10	4.4
Total	13,651																					

[1] Less than 0.5 percent.

[Ocean area: 1,565. Position: Lat. 15° to 20° N., Long. 65° to 70° W. Years covered 1880–1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	1,323	11.6	7	41	38	6	2	1	1	1	3	1	1	(1)	1	3	9	1	0	1	14	4.4
February	1,082	11.1	6	39	41	8	2	1	1	1	1	1	(1)	1	(1)	2	6	0	(1)	1	11	4.4
March	1,242	10.6	7	34	40	9	3	2	1	2	2	2	1	(1)	(1)	2	4	0	0	2	11	4.0
April	1,270	10.6	3	30	47	12	3	1	1	1	2	2	(1)	0	(1)	2	4	(1)	(1)	1	9	4.2
May	1,151	10.2	1	19	56	18	2	1	1	1	1	1	1	(1)	(1)	2	5	1	(1)	(1)	10	4.8
June	1,148	11.6	1	17	62	16	2	1	(1)	(1)	1	4	1	0	1	3	6	1	(1)	1	8	4.8
July	1,196	12.5	1	24	62	9	1	1	(1)	1	1	4	2	0	(1)	3	8	1	(1)	1	9	4.6
August	1,253	11.1	2	27	56	9	2	1	1	1	1	3	3	(1)	(1)	3	5	1	(1)	1	9	4.4
September	1,188	9.3	3	22	47	19	4	1	1	1	2	2	1	(1)	1	3	7	1	(1)	1	11	4.5
October	1,185	8.9	3	22	47	17	4	3	1	1	2	1	(1)	(1)	(1)	3	6	1	(1)	1	11	4.3
November	1,186	10.6	6	38	38	10	3	2	1	1	1	1	(1)	(1)	(1)	3	8	1	(1)	1	9	4.4
December	1,389	11.1	7	45	36	6	2	1	1	1	1	1	1	(1)	(1)	3	9	(1)	(1)	1	10	4.4
Mean		10.8	4	30	47	12	2	1	1	1	2	2	1	(1)	(1)	3	6	1	(1)	1	10	4.4
Total	14,613																					

[1] Less than 0.5 percent.

Meteorological tables—Continued

[Ocean area: 1570. Position: Lat. 15° to 20° N., Long. 70° to 75° W. Years covered, 1880-1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0-10
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	1,355	11.1	8	49	31	5	1	1	1	2	2	2	(1)	0	(1)	2	4	(1)	(1)	3	10	3.9
February	1,277	10.6	7	42	35	6	2	2	2	2	2	1	1	(1)	1	1	4	(1)	0	2	8	3.9
March	1,496	9.7	8	41	30	7	2	2	3	3	4	2	(1)	0	1	2	3	(1)	(1)	3	8	3.9
April	1,409	8.9	7	34	36	8	4	2	2	3	4	4	(1)	(1)	(1)	2	3	(1)	(1)	1	9	4.2
May	1,267	9.3	4	29	44	11	3	2	2	2	3	2	1	(1)	1	2	4	1	(1)	1	8	4.5
June	1,281	10.2	3	27	47	14	3	1	1	1	3	4	(1)	(1)	(1)	2	4	1	(1)	1	7	4.5
July	1,428	10.2	3	30	50	10	2	1	1	1	2	5	1	(1)	0	2	3	2	(1)	1	9	4.3
August	1,425	9.3	4	34	43	10	3	1	1	1	3	4	1	0	(1)	1	3	1	(1)	1	10	4.2
September	1,397	8.4	3	32	42	12	3	1	2	1	4	1	0	0	(1)	3	5	1	(1)	1	6	4.2
October	1,476	8.4	4	33	37	12	5	3	2	1	3	2	(1)	(1)	(1)	3	5	1	(1)	1	10	4.4
November	1,304	10.2	9	47	27	6	2	2	2	2	3	2	(1)	0	(1)	3	5	(1)	(1)	2	10	4.3
December	1,327	12.0	9	50	29	4	2	1	1	2	2	2	(1)	0	(1)	2	5	(1)	0	3	10	4.1
Mean		9.9	6	37	37	9	3	1	2	2	3	3	(1)	(1)	(1)	2	4	1	(1)	2	9	4.2
Total	16,442																					

[1] Less than 0.5 percent.

[Ocean area: 1575. Position: Lat. 15° to 20°., Long. 75° to 80° W. Years covered, 1880–1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunder-storms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	2,000	11.6	9	54	26	3	1	(1)	1	2	4	2	(1)	(1)	(1)	2	4	(1)	(1)	3	8	4.1
February	1,903	10.2	11	41	30	5	1	1	2	4	5	3	(1)	(1)	(1)	1	3	(1)	(1)	3	7	3.9
March	2,310	9.3	10	42	28	6	2	1	1	5	5	2	(1)	(1)	(1)	1	2	0	0	2	6	3.8
April	1,997	9.3	6	40	34	9	2	1	1	2	5	3	1	(1)	(1)	1	4	(1)	0	1	6	4.0
May	1,950	9.7	4	34	41	11	2	1	1	1	5	2	(1)	(1)	(1)	3	3	1	(1)	1	7	4.7
June	2,161	11.6	2	28	53	10	2	1	(1)	1	3	3	2	(1)	(1)	3	5	1	(1)	2	6	4.8
July	2,434	12.0	2	34	50	8	1	(1)	(1)	1	4	5	1	(1)	(1)	2	3	1	(1)	2	6	4.5
August	2,296	10.2	4	35	43	7	1	1	1	2	6	3	1	(1)	(1)	2	3	1	(1)	1	8	4.3
September	2,236	8.4	5	29	41	12	3	1	1	1	7	1	(1)	(1)	(1)	3	4	1	(1)	1	8	4.6
October	2,396	8.0	6	29	34	12	5	3	2	2	7	1	(1)	(1)	1	4	4	1	(1)	1	7	4.8
November	2,060	9.7	13	46	24	5	1	2	1	2	6	1	(1)	(1)	(1)	3	5	(1)	(1)	2	7	4.6
December	1,915	11.6	12	53	25	3	(1)	(1)	1	2	4	1	(1)	(1)	(1)	2	5	(1)	(1)	2	9	4.1
Mean		10.1	7	39	36	7	2	1	1	2	5	2	(1)	(1)	(1)	2	4	1	(1)	2	7	4.4
Total	25,658																					

[1] Less than 0.5 percent.

Meteorological tables—Continued

[Ocean area: 1060. Position: Lat. 10° to 15° N., long. 60° to 65° W. Years covered, 1880–1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	840	12.0	5	55	36	3	(1)	(1)	(1)	(1)	1	2	(1)	(1)	1	3	9	(1)	(1)	1	11	4.4
February	838	11.6	4	53	38	3	(1)	(1)	(1)	(1)	2	3	1	(1)	(1)	2	7	(1)	(1)	1	11	4.2
March	864	10.6	5	49	37	6	(1)	(1)	(1)	1	2	4	1	(1)	1	1	6	(1)	(1)	1	11	4.3
April	776	10.6	2	41	48	7	1	(1)	(1)	(1)	1	3	1	0	1	1	4	(1)	(1)	1	12	4.4
May	760	10.6	2	32	55	9	1	(1)	(1)	(1)	1	4	1	(1)	(1)	3	5	(1)	(1)	1	13	4.3
June	725	12.0	5	49	38	4	1	1	1	(1)	1	6	1	0	1	4	8	1	(1)	1	9	4.7
July	767	10.6	1	39	51	5	1	1	(1)	(1)	2	4	1	(1)	(1)	4	10	1	(1)	1	11	4.7
August	802	9.3	3	36	41	10	2	3	1	1	3	3	(1)	(1)	(1)	4	7	1	(1)	1	12	4.6
September	768	8.9	2	32	45	13	2	1	1	1	3	2	0	(1)	(1)	3	6	1	(1)	(1)	12	4.3
October	843	8.4	3	28	45	14	3	2	1	1	3	2	1	(1)	(1)	3	8	1	(1)	(1)	15	4.4
November	848	9.3	3	38	45	8	2	1	1	1	1	1	1	(1)	1	4	8	(1)	0	1	13	4.4
December	890	9.7	5	47	37	6	1	(1)	(1)	1	3	2	1	(1)	1	3	10	(1)	1	(1)	11	4.4
Mean		10.3	3	42	43	7	1	1	(1)	1	2	3	1	(1)	1	3	7	(1)	(1)	1	12	4.4
Total	9,721																					

[1] Less than 0.5 percent.

[Ocean area: 1065. Position: Lat. 10° to 15° N., Long. 65° to 70° W. Years covered, 1880–1933. Greenwich noon observations]

Month	Number of Observations surveyed	Wind										Weather										Mean cloud amount (0–10)	Prevailing cloud type	Prevailing direction of middle clouds
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—												
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility			
January	481	12.0	2	42	49	4	(1)	(1)	0	(1)	3	2	(1)	(1)	0	3	6	0	0	2	13	4.4	Cu.	ENE.
February	495	12.0	2	42	51	3	(1)	1	(1)	(1)	(1)	2	0	1	(1)	1	6	0	(1)	1	14	4.1	Cu.	E.
March	496	12.0	2	40	50	4	1	(1)	(1)	2	1	3	1	0	(1)	(1)	3	0	(1)	1	11	4.1	Cu.	E.
April	501	12.0	2	32	57	6	(1)	1	1	1	(1)	6	(1)	0	(1)	1	3	(1)	(1)	(1)	15	4.4	Cu.	E.
May	457	13.0	(1)	25	62	8	1	1	1	1	1	4	1	0	0	0	3	1	(1)	(1)	11	4.7	Cu.	E.
June	488	13.5	1	17	69	10	1	1	1	(1)	(1)	3	1	(1)	(1)	1	6	(1)	(1)	2	10	4.6	Cu.	E.
July	537	13.5	1	27	65	5	1	(1)	(1)	(1)	1	5	1	0	(1)	4	6	1	0	2	10	4.5	Cu.	E.
August	543	11.6	1	21	64	9	1	1	1	1	1	2	(1)	(1)	1	4	5	1	0	1	13	4.2	Cu.	E.
September	544	10.2	1	20	61	14	1	(1)	(1)	1	2	1	(1)	(1)	(1)	1	4	(1)	0	0	12	4.1	Cu.	E.
October	571	9.3	1	24	55	11	1	2	2	2	2	1	0	(1)	(1)	3	5	(1)	0	1	15	4.4	Cu.	E.
November	497	9.7	4	37	45	8	1	1	1	1	2	2	1	(1)	(1)	2	8	1	0	1	15	4.4	Cu.	E.
December	521	12.5	3	51	39	2	1	1	1	1	1	1	1	(1)	0	3	7	0	(1)	(1)	12	4.3	Cu.	ENE.
Mean		11.8	2	31	55	7	1	1	1	1	1	3	1	(1)	(1)	2	5	(1)	(1)	1	13	4.4		
Total	6,131																							

[1] Less than 0.5 percent.

Meteorological tables—Continued

[Ocean area: 1070. Position: Lat. 10° to 15° N., Long. 70° to 75° W. Years covered, 1879–1934. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	495	15.0	2	54	41	3	(1)	0	(1)	(1)	(1)	5	0	(1)	(1)	1	5	0	0	3	13	2.3
February	465	14.5	2	51	43	2	0	0	0	1	1	4	(1)	0	(1)	1	3	0	0	5	10	3.7
March	548	13.5	4	52	39	4	(1)	(1)	1	(1)	(1)	5	(1)	(1)	(1)	(1)	2	(1)	(1)	3	12	3.8
April	512	13.5	3	52	43	1	(1)	0	(1)	0	1	7	1	0	(1)	1	2	0	0	2	12	4.3
May	514	13.5	3	34	54	5	1	1	1	(1)	1	7	(1)	(1)	0	1	3	1	0	3	8	4.8
June	557	15.0	1	37	56	4	1	(1)	1	(1)	(1)	6	2	(1)	(1)	1	4	1	0	3	8	4.9
July	500	16.5	1	44	49	3	0	1	1	0	1	8	1	1	1	1	3	1	(1)	6	12	4.3
August	499	13.0	1	45	45	3	2	1	1	1	1	5	(1)	(1)	0	1	2	2	0	2	12	4.2
September	505	11.6	2	33	52	8	2	1	1	(1)	1	5	1	0	(1)	2	4	2	(1)	1	14	4.7
October	586	10.6	1	34	45	7	5	3	1	2	2	2	(1)	(1)	1	4	6	3	0	1	13	4.8
November	541	11.1	3	47	34	5	3	2	2	2	2	3	1	0	(1)	3	8	2	(1)	1	6	4.8
December	522	15.0	2	57	37	1	1	(1)	1	1	(1)	1	1	0	1	2	8	0	0	2	13	4.2
Mean		13.6	2	45	44	4	1	1	1	1	1	5	1	(1)	(1)	2	4	1	(1)	3	11	4.4
Total	6,244																					

[1] Less than 0.5 percent

[Ocean area: 1075. Position: Lat. 10° to 15° N., Long. 75° to 80° W. Years covered, 1885–1934. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls	Gales (force 7 or over)	Exceptional visibility	
January	1,986	15.5	11	73	14	1	(1)	(1)	0	1	(1)	4	(1)	0	(1)	2	5	(1)	(1)	5	9	4.5
February	1,813	14.5	13	69	14	3	(1)	(1)	(1)	1	(1)	4	(1)	(1)	(1)	6	4	(1)	(1)	4	8	4.5
March	2,118	13.5	16	65	13	1	1	(1)	1	2	1	4	(1)	(1)	(1)	1	2	(1)	(1)	3	4	4.5
April	2,057	12.0	15	66	14	2	1	(1)	(1)	1	1	6	1	(1)	(1)	3	3	(1)	0	2	3	5.1
May	1,937	11.1	7	57	23	4	2	2	1	2	2	4	1	1	1	3	5	1	(1)	1	8	5.4
June	2,088	12.5	4	56	28	4	2	2	1	1	2	5	1	(1)	(1)	4	6	2	(1)	3	7	5.7
July	2,362	14.5	3	67	23	2	1	1	1	1	1	6	1	(1)	(1)	3	4	1	(1)	5	6	5.5
August	2,244	12.0	5	60	23	5	2	1	1	1	2	4	(1)	(1)	(1)	3	4	2	(1)	2	7	5.2
September	2,104	8.4	7	47	24	8	4	3	1	2	4	2	1	(1)	(1)	5	5	2	(1)	(1)	9	5.5
October	2,041	8.4	5	40	21	9	7	7	3	3	3	1	(1)	(1)	(1)	5	7	2	(1)	1	9	5.4
November	1,988	10.6	11	53	15	4	5	4	3	3	2	1	1	(1)	1	6	7	1	0	1	8	5.4
December	2,065	15.0	8	75	12	1	1	(1)	1	1	1	4	1	(1)	(1)	3	5	(1)	(1)	4	8	4.7
Mean		12.3	9	60	18	4	2	2	1	2	2	4	1	(1)	(1)	4	5	1	(1)	3	7	5.1
Total	23,803																					

[1] Less than 0.5 percent.

Meteorological tables—Continued

[Ocean area: 0575 (Caribbean Sea portion). Position: Lat. 5° to 10° N., Long. 75° to 80° W. Years covered, 1883–1933. Greenwich noon observations]

Month	Number of observations surveyed	Wind										Weather										Mean cloud amount (0–10)
		Mean velocity (knots)	Percentage of observations from—									Percentages of observations recording—										
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Showers	Thunderstorms	Heavy squalls.	Gales (force 7 or over)	Exceptional visibility	
January	231	11.6	45	44	4	2	0	1	2	2	(1)	7	0	1	1	1	6	0	0	1	8	5.3
February	190	10.6	36	45	4	3	1	1	1	8	1	3	1	0	1	3	1	0	0	2	8	4.6
March	230	10.2	39	47	2	1	1	1	1	7	1	8	2	0	0	1	3	0	0	2	7	5.2
April	169	9.3	34	38	6	4	3	2	2	10	1	1	1	0	1	3	2	0	0	1	6	5.4
May	153	5.3	17	32	5	8	11	4	6	5	12	3	1	1	1	8	8	2	0	0	7	5.7
June	232	4.9	14	23	8	10	13	9	4	6	13	2	1	0	0	8	6	5	0	0	6	5.7
July	214	7.2	12	42	8	6	9	8	3	4	8	5	1	0	0	6	5	4	(1)	0	4	6.5
August	268	5.7	10	32	8	6	6	13	10	5	10	4	1	(1)	(1)	6	6	2	(1)	1	4	6.3
September	207	5.3	9	18	8	14	11	14	10	7	9	1	0	0	1	8	6	4	0	0	7	5.9
October	154	5.3	9	14	8	13	18	14	13	5	6	0	0	1	2	9	4	1	1	0	6	5.5
November	216	6.8	13	26	10	13	10	12	4	7	5	1	1	0	0	14	8	2	(1)	1	7	6.3
December	193	9.3	22	52	9	1	3	3	4	3	3	5	1	0	0	4	5	0	0	1	5	5.1
Mean		7.6	21	34	7	7	7	7	5	6	6	3	1	(1)	1	6	5	2	(1)	1	6	5.6
Total	2,457																					

[1] Less than 0.5 percent.